

**United States Department of the Interior
Bureau of Land Management**

**Environmental Assessment
for the December 2018 Competitive Oil & Gas Lease
Sale**

**Royal Gorge Field Office
3028 East Main Street
Canon City, CO 81212**

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Chapter 1 - Introduction

1.1 Identifying Information

BACKGROUND:

It is the policy of the Bureau of Land Management (BLM) as derived from various laws, including the Mineral Leasing Act of 1920 (MLA) and the Federal Land Policy and Management Act of 1976 (FLPMA), to make mineral resources available for disposal and to encourage development of mineral resources to meet national, regional, and local needs.

BLM's Colorado State Office conducts quarterly competitive sales to lease available oil and gas parcels. A Notice of Competitive Lease Sale (Sale Notice), which lists lease parcels to be offered at the auction, is published by the Colorado State Office at least 45 days before the auction is held. Lease stipulations applicable to each parcel are specified in the Sale Notice. The decision as to which public lands and minerals are open for leasing and what leasing stipulations may be necessary, based on information available at the time, is made during the land use planning process. Constraints on leasing and any future development of split estate parcels are determined by BLM in consultation with the appropriate surface management agency or the private surface owner.

In the process of preparing a lease sale, the Colorado State Office sends a draft parcel list to each field office where the parcels are located. Field office staff then review the legal descriptions of the parcels to determine if they are in areas open to leasing and that appropriate stipulations have been included; verify whether any new information has become available that might change any analysis conducted during the planning process; confirm that appropriate consultations have been conducted; and identify any special resource conditions of which potential bidders should be made aware. The proposed parcels are posted online for a fifteen-day public scoping period. BLM conducts a review consistent with the National Environmental Policy Act (NEPA). Scoping comments received from the public are reviewed and incorporated into the NEPA document, as appropriate.

After the field office completes the draft parcel review and NEPA review and makes its leasing recommendation to the state office, a list of proposed lease parcels and associated stipulations is made available to the public through a Sale Notice, which is posted on the Colorado BLM website at:

<https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/col>

[orado](#). Occasionally, BLM may defer or withhold additional parcels prior to the day of the lease sale. In such cases, BLM prepares an addendum to the Sale Notice. Prior to the lease sale, the Deputy State Director signs a decision in which he or she determines which parcels are available and will be offered for lease in the upcoming sale.

If the parcels are not leased at the December 2018 lease sale, then they will remain available for up to two years, and may be leased to any qualified lessee at the minimum bid cost. Parcels obtained in this way may be re-parceled by combining or deleting other previously offered lands.

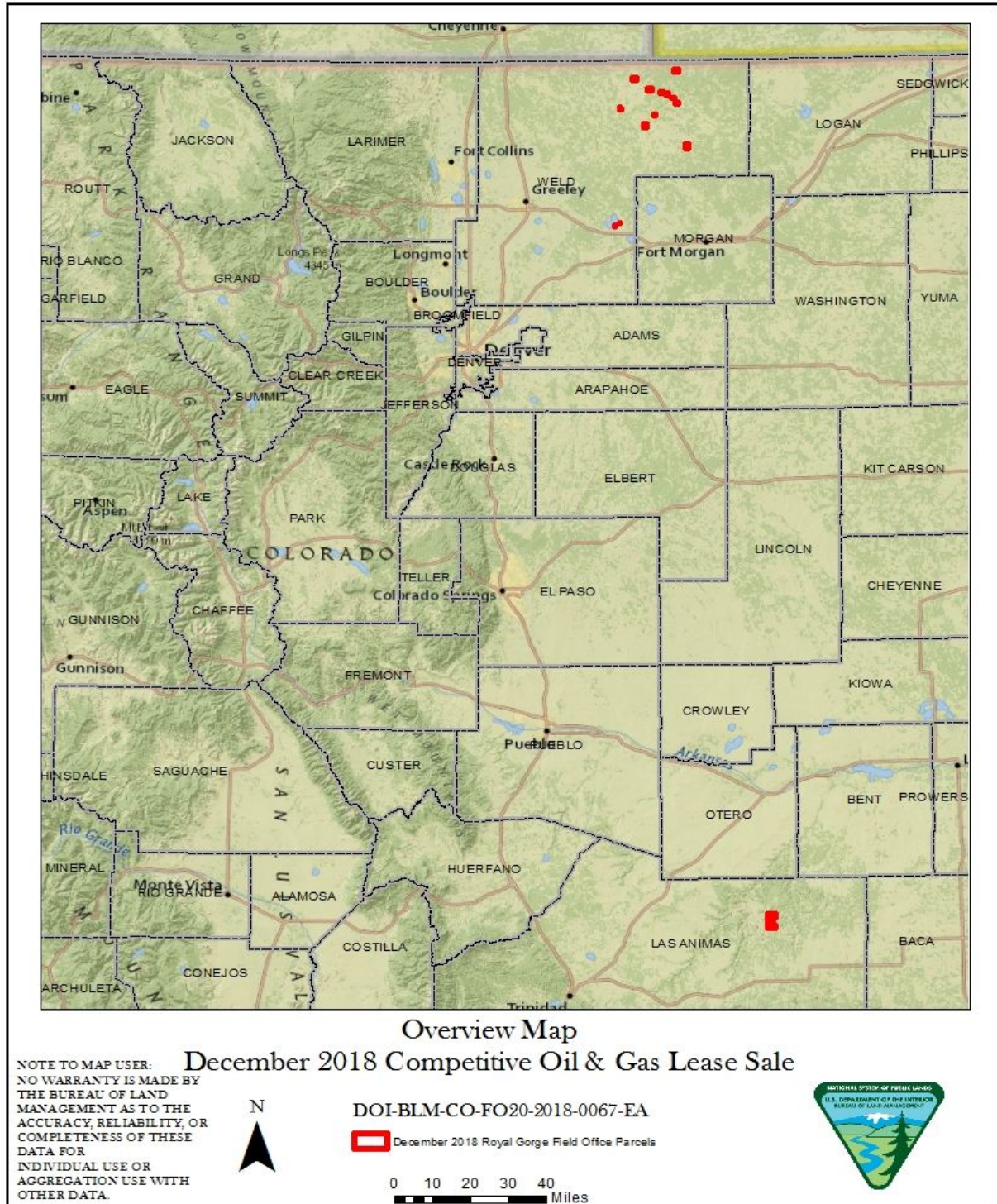
Mineral estate that is not leased within two-years after an initial offering will no longer be available, and must go through a new competitive lease sale process before being leased.

The act of leasing does not authorize any development or use of the surface of lease lands without further application by the lessee and approval by BLM. In the future, BLM may receive Applications for Permit to Drill (APDs) for those parcels that are leased. If APDs are received, BLM conducts additional site-specific NEPA analysis before deciding whether to approve the APD, and what conditions of approval (COAs) should apply.

In response to expressions of interest, BLM initially considered twelve parcels comprising 5,217.41 acres within the Royal Gorge Field Office (RGFO) for the December 2018 Competitive Oil and Gas Lease Sale. This figure is comprised of 1.490 acres of federal land and 5215.920 acres of split estate land. The legal descriptions of the parcels are listed in Attachment A.

This Environmental Assessment (EA) documents the review of the proposed parcels in accordance with NEPA . It also documents BLM's verification that leasing the parcels would conform with the approved land use plan, and provides the rationale for the field office's recommendation to offer or to defer particular parcels from a lease sale.

1.2 Project Location and Legal Description



LEGAL DESCRIPTION: Please see Attachments A, B, and C and E (Maps)

1.3 Purpose and Need

The purpose of the Proposed Action is to consider opportunities for private individuals or companies to explore and develop oil and gas resources on specific public lands through a competitive leasing process.

The need for the action is to respond to the expression of interest for leasing, consistent with BLM's responsibility under the MLA, as amended, to promote the development of oil and gas on the public domain. Parcels may be identified for BLM's consideration by the public, BLM or other agencies. The MLA establishes that deposits of oil and gas owned by the United States are subject to disposition in the form and manner provided by the MLA under the rules and regulations prescribed by the Secretary of the Interior, where consistent with FLPMA and other applicable laws, regulations, and policies.

1.3.1 Decision to be Made

BLM will decide whether to lease the proposed parcels and, if so, under what terms prescribed by the RMP.

1.4 Public Participation

1.4.1 Scoping

The principal goal of scoping is to identify issues, concerns, and potential impacts that require detailed analysis. BLM uses both internal and external scoping to identify potentially affected resources and associated issues.

Internal scoping was conducted through discussion of the parcels by an interdisciplinary (ID) team of resource specialists.

BLM conducted external scoping by posting for 15 days (from July 2 to July 17, 2018) on the project website the parcels being considered for leasing, and their respective stipulations from the Resource Management Plans (RMPs). Stipulation summaries, GIS shapefiles, and maps were posted on the BLM Colorado State Office website:

<https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/colorado>. During external scoping, members of the public provided seven comments on the

Proposed Action, which BLM considered and incorporated into the EA as appropriate. BLM sent letters to surface owners whose land overlies federal minerals proposed for leasing.

1.4.2 Issues Identified

The BLM considered several issues identified during project scoping, including impacts to wildlife, birds, raptors, endangered plants, historic landmarks, public health, air quality, water quality and climate, as well as impacts associated with hydraulic fracturing and carbon emissions. The external scoping comments were useful in drafting the EA, and some issues raised in comments were carried forward for analysis. Some site-specific issues are more properly addressed in subsequent NEPA analysis if and when development on the potential leased areas is proposed.

1.4.3 Public Comment Period

The preliminary EA and the unsigned Finding of No Significant Impact (FONSI) are available for a 15 day public review and comment period beginning August 27, 2018 and ending September 11, 2018. The document was available online at <https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/leasing/regional-lease-sales/colorado> and in the public room at the Royal Gorge Field Office. Comments received from the public were reviewed and incorporated into the EA as appropriate. Response to comments is in appendix F.

Chapter 2 - Alternatives

2.1 Introduction

This chapter describes the alternatives analyzed in detail.

2.2 Alternatives Analyzed in Detail

2.2.1 No Action Alternative

In an EA, the No Action Alternative typically means that the Proposed Action would not take place. See BLM NEPA Handbook (H-1790-1).

Under the No Action Alternative, BLM would defer all proposed parcels from the December 2018 lease sale. Surface management would remain the same and ongoing oil and gas development would continue on surrounding private, state, and federal leases. The deferred parcels could be considered for inclusion in future lease sales.

2.2.2 Preferred Alternative

Under the preferred alternative, BLM would offer twelve parcels totaling 5,217.410 acres for lease. The parcels are eligible for leasing in accordance with the Northeast (December 1991, as amended) and RGFO (May, 1996) RMPs.

The lease sale would include parcels in Weld and Las Animas counties. Those lands proposed for lease under this alternative total 5,217.410 acres of federal mineral estate and include a combination of federal and private surface (see Attachment A). The lands have been grouped into appropriate lease parcels for competitive sale as oil and gas leases in accordance with the 43 CFR 3100 regulations. The leases would include the standard lease terms and conditions for development of the surface of oil and gas leases provided in 43 CFR 3100. Stipulations to protect other surface and subsurface resources would apply, as prescribed by the appropriate RMP. These stipulations are described in Attachment D.

2.3 Alternatives Considered but not Analyzed in Detail

No other alternatives to the proposed action were identified that would meet the purpose and need of the proposed action.

2.4 Plan Conformance Review

The proposed action was reviewed for conformance (43 CFR 1610.5-3) with the following plans:

Name of Plan: Northeast Resource Area Plan and Record of Decision as amended by the Colorado Oil and Gas Final EIS and Record of Decision

Date Approved: 09/16/86 amended 12/06/91

Decision Language: The RMP designated approximately 672,000 acres of federal mineral estate open for continued oil and gas development and leasing. The RMP (with associated amendments) also describes specific stipulations that would be attached to new leases offered in certain areas. Under the action alternatives, parcels to be offered would be leased subject to stipulations prescribed by the RMP. Therefore, the alternatives considered conform to the fluid mineral leasing decisions in the RMP and subsequent amendments, and are consistent with the RMP's goals and objectives for natural and cultural resources.

Name of Plan: Royal Gorge Record of Decision and Resource Management Plan (RMP)

Date Approved: May 1996

Decision Language: BLM administered mineral estate will be open to fluid minerals leasing, exploration and production, subject to the lease terms and applicable lease stipulations.

Chapter 3 - Affected Environment and Effects

3.1 Introduction

The CEQ Regulations state that NEPA documents “must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail” (40 CFR 1500.1(b)). While many issues may arise during scoping, not all of the issues raised warrant analysis in an EA. Issues will be analyzed if 1) an analysis of the issue is necessary to make a reasoned choice between alternatives, or 2) if the issue is associated with a significant direct, indirect, or cumulative impact, or where analysis is necessary to determine the significance of the impacts. The following resources and management issues were determined to not be present or not expected to be impacted by the proposed action and alternatives: Forestry, Special Status Plants, Access and Transportation, Fire Management, Range Management, Prime and Unique Farmlands, Realty Authorizations and Land Tenure, Recreation, Special Designations, Areas of Critical Environmental Concern, Wild and Scenic Rivers, Lands with Wilderness Characteristics and Wilderness Study Areas.

3.2 Environmental Consequences of the No Action Alternative

The No Action Alternative is used as the baseline for comparison of the alternatives. Under the No Action Alternative, the twelve parcels totaling 5,217.410 acres would not be leased. There would be no subsequent impacts from oil and/or gas construction, drilling, and production activities. The No Action Alternative would result in the continuation of the current land and resource uses in the proposed lease areas.

BLM assumes that the No Action Alternative (no lease option) may result in a slight reduction in domestic production of oil and gas. However, oil and gas production and consumption is driven by a variety of complex interacting factors including energy costs, energy efficiency, availability of other energy sources, economics, demographics, geopolitical circumstances, and weather so therefore, it is uncertain if and to what extent the No Action Alternative may have on overall domestic oil and gas production.

3.3 Past, Present and Reasonably Foreseeable Actions

NEPA requires federal agencies to consider the cumulative effects of proposals under their review. Cumulative effects are defined in the CEQ regulations 40 CFR §1508.7 as “the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency . . . or person undertakes such other actions.” In its guidance, the CEQ has stated that the “cumulative effects analyses should be conducted on the scale of human communities, landscapes, watersheds, or airsheds” using the concept of “project impact zone” (i.e., the area that might be influenced by the Proposed Action).

Offering and issuing leases for the subject parcels, in itself, would not result in cumulative impacts to any resource. Nevertheless, future development of the leases could be an indirect effect of leasing. The RMPs/EISs, provides BLM’s analysis of cumulative effects of oil and gas development based on the reasonable, foreseeable oil and gas development (RFD) scenario. This analysis is hereby incorporated by reference and is available at <https://eplanning.blm.gov/epl-front-office/eplanning/planAndProjectSite.do?methodName=dispatchToPatternPage¤tPageId=99527>

The cumulative impacts analysis in the EIS(s) accounted for the potential impacts of development of lease parcels in the planning area as well as past, present and reasonably foreseeable actions known at that time. This analysis expands upon the EIS’s analyses by incorporating new information.

The area of influence includes parcels in Weld County, which has primarily rangeland. Las Animas County has primarily uncultivated short grass prairie.

3.3.1 Past Actions

A vast majority of the proposed acreage is split estate, where the surface is not managed by BLM. The BLM does not maintain information about non-mineral activity on split estate parcels on private land but evidence indicates that livestock grazing has been the predominant use. Aerial photography of the parcels on the eastern plains indicate that over grazing and several years of drought conditions have produced an almost barren landscape in some locations. No evidence suggests that any past actions by BLM have affected these parcels.

3.3.2 Present Actions

The vast majority of the proposed acreage is split estate, where the surface is not managed by BLM. There is minimal BLM managed surface near the proposed parcels so BLM has very limited information about current uses. Evidence from aerial photos suggests that private livestock grazing is currently the predominant use. Most parcels are located in areas that have had minimal oil and gas development.

3.3.3 Reasonably Foreseeable Future Actions

The Reasonable Foreseeable Development (RFD) Scenario for the RGFO is an estimate of fluid mineral exploration, development, and production potential compiled for the Royal Gorge Field Office for a 20-year (2011-2030) timeframe, based on information available at the time the RFD was written. The chart below shows what parcels are in the categories very low, low, moderate and high potential as well as the counties involved.

Wells per township	Parcel Numbers	Counties
Very Low < 1 well	8341,8343	Las Animas
Low 1 < 5 wells	None	
Moderate 5 < 10 wells	8373	Weld
Moderately High 10-20 wells	8405,8406,8408,8411	Weld
High > 30-50 wells	8347,8407,8409,8410,8412	Weld
Very High > 50-150 wells	None	

The vast majority of parcels are private surface and BLM has no jurisdiction nor do we know what the future holds for surface activities on private lands. The only parcel with BLM surface is 1.5 acres surrounding Riverside Reservoir and it is reasonable to assume that oil and gas activity that is currently occurring in the area will continue.

3.4 Environmental Consequences of Leasing and Potential Development

3.4.1 Physical Resources

3.4.1.1 Air Quality and Climate

Data from the current version of BLM Colorado’s 2015 Annual Report for Air Resources is incorporated by reference in this analysis to provide information for the affected environment and cumulative impacts analysis. The current version of the Annual Report is available to the public on BLM Colorado’s website at:

<https://www.blm.gov/programs/natural-resources/soil-air-water/air/colorado>.

Affected Environment

General Climate:

The RGFO encompasses a large geographical area with an appreciable amount of daily meteorological and climatic variance. Frequent winds and limited topographical influences in the majority of the RGFO provide excellent dispersion characteristics for distributing anthropogenic emissions. More climate information can be found in the “Climate Statistics and Change Analysis” section of the online Annual Report.

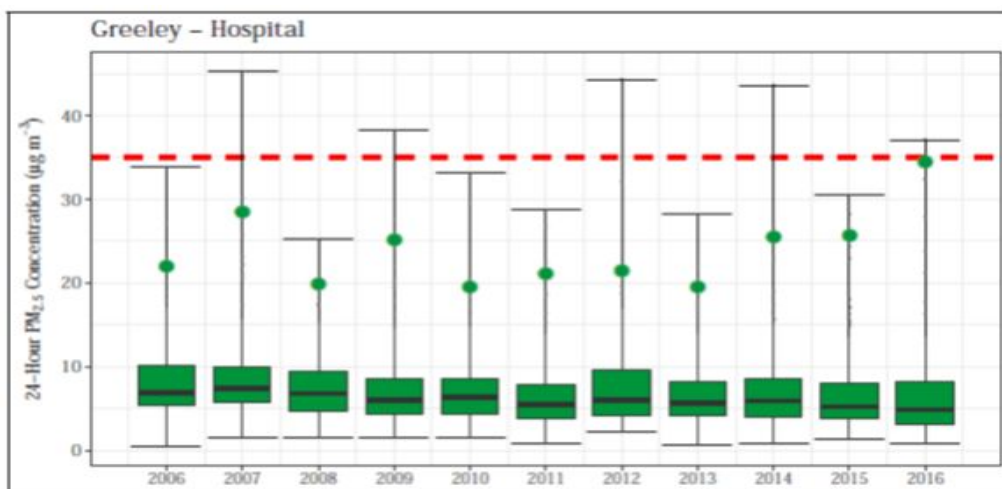
Air Quality Standards and Monitored Pollutant Concentrations:

Analysis indicators related to air quality can be described in terms of pollutant classes, standards, and concentrations. The online Annual Report “Criteria Air Pollutants” and “Hazardous Air Pollutants” sub-sections provides additional information for this section.

The following charts were taken directly from the Colorado Department of Public Health and Environment, Air Pollution Control Division (APCD) 2016 Air Quality Data Report and provide air quality monitored values for air monitors located in or near to the counties containing the proposed parcels within the Royal Gorge Field Office.



Ozone plot – 8-hour average ozone concentrations at the Greeley – Weld, County Tower Station. The 8-hour standard (0.070 ppm) is shown as a dashed red line. The annual design value (4th highest daily maximum 8-hour average value) is shown for each year as a green point.



PM2.5 plot – 24-hour average PM2.5 concentrations at the Greeley – Hospital Station. The 24-hour standard (35 ug/m3) is shown as a dashed red line. The annual design value (98th percentile of values measured throughout the year) is shown for each year as a green point.

Air quality in the majority of the RGFO meets the standards, however in certain areas of the Field Office, measurements of pollutants have either exceeded or violated an air quality standard. Historically, these problem areas have centered around the larger Front Range metropolitan areas that tend to have large amounts of pollutant emitting sources and activities. The RGFO currently

has five areas that have a designation other than attainment / unclassifiable; the Denver Metro Area / Northern Front Range 8-hour O₃ Non-Attainment Area (NAA), the Colorado Springs CO Maintenance Area, and the Denver, Canon City and Larimer Co. PM₁₀ Maintenance Areas. In these areas the state applies more stringent air pollution control requirements. Three of the proposed parcels (8373, 8405 and 8406) are located within the Denver Metro Area / Northern Front Range 8-hour O₃ Non-Attainment Area.

General Conformity:

The online Annual Report “Nonattainment and General Conformity” section is being incorporated by reference to provide information for this section. The current version of the Annual Report can be found here:

<https://www.blm.gov/programs/natural-resources/soil-air-water/air/colorado>

PSD and AQRVs:

Another relative indicator of air quality is the prevention of significant deterioration (PSD) increments. The PSD program is a Clean Air Act permitting program for new and modified major air pollution sources and is administered in Colorado by the APCD.

Air quality related values (AQRVs) provide another measure of air quality with respect to atmospheric phenomena such as visibility impairment and pollutant deposition. Measuring AQRVs is particularly important in federal Class I lands, which include areas such as national parks and wilderness areas. Class I areas are granted special air quality protections under Section 162(a) of the Clean Air Act.

Additional information regarding PSD analyses and AQRVs can be found in the “Airshed Classes and the Prevention of Significant Deterioration” and “Air Quality Related Values” sub-sections of the online Annual Report.

Baseline Emissions Data:

Baseline emissions data for counties and areas near the proposed lease parcels can be obtained from the “Emissions Source Classifications and Regulatory Status” section of the online 2015 Annual Report. The online Annual Report user will need to select National Emissions Inventory (NEI) year and Colorado county from a drop-down list.

CARMMS Modeling Baseline Conditions:

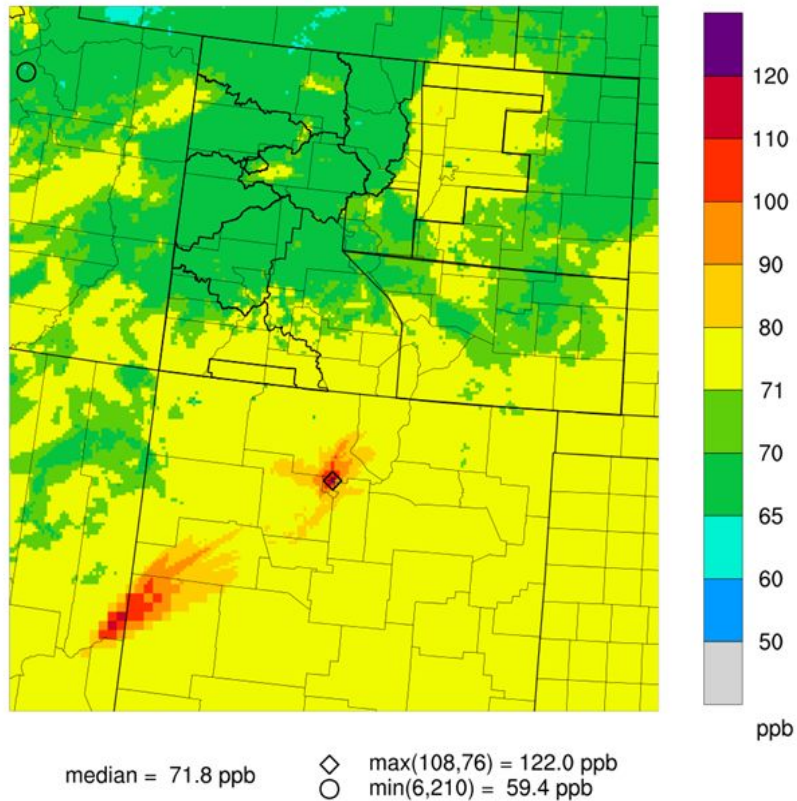
In addition to providing APCD 2016 Report data/information for actual monitored/observed conditions around the Planning Area to describe the affected environment, CARMMS 2.0 base year 2011 modeling results are being provided to assist with setting up baseline conditions for describing potential air quality related changes associated with potential Planning Area activity (new oil and gas development, etc.) and cumulative emissions inventories for CARMMS 2.0 future year 2025 modeling. CARMMS 2.0 projected year 2025 modeling results and changes from the following baseline conditions can be found in the environmental consequences section of this EA.

The following lists some of the CARMMS 2.0 modeled baseline conditions around the area; note that the environmental consequences section of this EA describes year 2025 future design values (DVF) that are developed using the 2011 CARMMS 2.0 modeling results (DVBs), and cumulative impact changes from baseline year 2011 through future modeled year 2025 for several air quality related parameters (visibility, deposition, etc.):

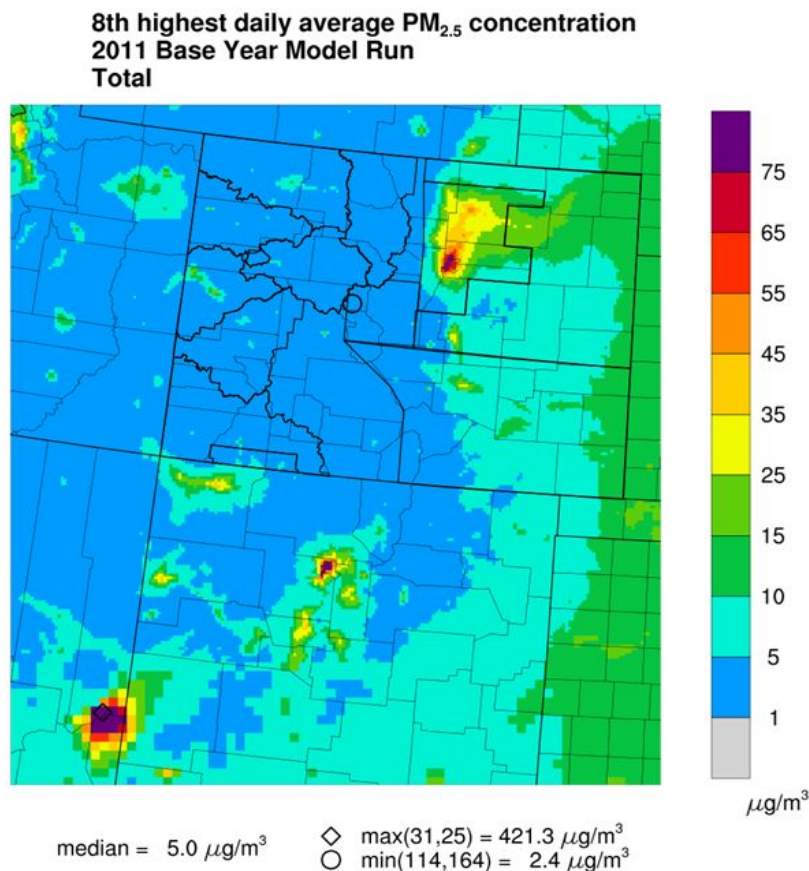
- There were nineteen (19) year 2011 baseline modeled ozone design values (DVB) for eastern Colorado Front Range ozone monitors above the current ozone standard (70 ppb).
- Modeled baseline worst (dirtiest) 20% days cumulative visibility metric values (deciview – dv) for Rocky Mountain NP and Great Sand Dunes NP were 11.84 dv and 11.57 dv, respectively.
- CARMMS 2.0 modeled baseline year 2011 total cumulative maximum (max of all grid cells covering Class I Area) annual nitrogen deposition at for Rocky Mountain NP and Great Sand Dunes NP are 3.04 kg/ha-yr and 2.22 kg/ha-yr, respectively.

The following plot shows CARMMS 2.0 modeled 4th highest 8-hour average daily maximum ozone concentrations for base year 2011 cumulative emissions inventories. As shown, baseline year 2011 ozone concentrations along the Denver – Front Range are above the ozone NAAQS (shaded yellow). Note that the maximum modeled ozone concentrations shown in Arizona and New Mexico were associated with wildfires that occurred for year 2011. The CARMMS 2.0 future year 2025 modeling results analysis (presented for the potential impacts section) includes (or references) plots showing changes from these modeled baseline 2011 conditions to future year 2025 for three future year 2025 modeling emissions scenarios.

**4th High 8 Hour Avg Daily Max Ozone
2011 Base Year Model Run
Total**



The following plot is similar to the previous ozone plot and shows CARMMS 2.0 modeled 8th highest 24-hour average $PM_{2.5}$ concentrations for baseline 2011 cumulative emissions inventories. Areas along the Denver – Front Range and near the wildfires (Arizona and New Mexico) were modeled above the $PM_{2.5}$ 24-hour NAAQS.



GHG and Climate Change:

Information from the online Annual Report

(<https://www.blm.gov/programs/natural-resources/soil-air-water/air/colorado>) is incorporated by reference. Baseline GHG and climate change information can be found in the “Climate Change Baselines” section of the online Annual Report.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The decision to offer the identified parcels for lease would not result in any direct emissions of air pollutants. However, any future development of these leases would result in emissions of criteria, VOC, HAP and GHG pollutants. Subsequent development would result in both short and longer term emissions of pollutants, including GHGs. Developmental air impacts will be examined in a subsequent analysis when lessees file an Application for Permit to Drill (APD). The analysis will evaluate if any contemporaneous incremental increases from project emissions

would be expected to cause significant impacts at the local and regional scales. All proposed activities including, but not limited to, exploratory drilling activities would be subject to applicable local, State, and Federal air quality laws and regulations.

Subsequent activity authorized after APD approval could include soil disturbances resulting from the construction of well pads, access roads, pipelines, power lines, and drilling. Any disturbance is expected to cause increases in fugitive dust and potentially inhalable particulate matter (specifically PM₁₀ and PM_{2.5}) in the project area and immediate vicinity. Particulate matter, mainly dust, may become airborne when drill rigs and other vehicles travel on dirt roads to drilling locations. Air quality may also be affected by exhaust emissions from engines used for drilling, transportation, gas processing, compression for transport in pipelines, and other uses.

These sources will contribute to potential short and longer term increases in the following criteria pollutants: carbon monoxide, ozone (a secondary pollutant, formed via photochemical reactions between VOC and NO_x emissions), nitrogen dioxide, and sulfur dioxide. Non-criteria pollutants (for which no national standards have been set) such as carbon dioxide, methane and nitrous oxide (GHGs), air toxics (e.g., benzene), and total suspended particulates (TSP), as well as impacts to visibility and atmospheric deposition may also increase as a result of exploration and development.

During exploration and development, ‘natural gas’ may at times be flared and/or vented from conventional, coal bed methane, and shale wells (depending on the resources present on the lease). The gas is likely to contain volatile organic compounds that could also be emitted from reserve pits, produced water disposal facilities, and/or tanks located at the site. The development stage may include the installation of pipelines for transportation of raw product. New centralized collection, distribution and/or gas processing facilities may also be necessary.

Research has identified the general potential impacts of anthropogenic GHG emissions and their effects on global climatic conditions. Anthropogenic GHGs differentially absorb and emit thermal radiation in the atmosphere and; therefore, may contribute incrementally to climate change. Changes in global temperatures and climate vary significantly with time, and are subject to a wide range of driving factors and complex interrelationships. Research on climate change impacts is an emerging and rapidly evolving area of science, but given the lack of adequate analysis methods it is not possible to identify specific local, regional, or global climate change impacts based on potential GHG emissions from any specific project’s incremental contributions to the global GHG burden. In the coming decades, climate change may lead to changes in the Mountain West and Great Plains, such as increased drought and wildland fire potential. The

BLM will continue to evaluate the impacts of oil and gas exploration and development on the global climate as the science and analytical tools evolve, and will apply appropriate adaptive management techniques and BMPs to address changing conditions.

Typical Federal O&G Development and Related Emissions for New Wells in the Area:

Many leases are never developed (see “Statewide Oil and Gas Statistics” section of online Annual Report). But, to hold a lease beyond the 10 year primary lease term, operators must construct at least one well capable of producing economic quantities (unless the parcel is included in a unit which may alter the lease term). For this assessment, BLM developed an estimated average per well emissions inventory based on eleven (11) actual recent oil and gas projects (2017-2018) in areas near the parcels proposed for lease. The emissions inventory is only useful for estimating a range of potential indirect impacts of leasing the proposed parcels, if developed in the future. Since it is unknown if the parcels would actually be explored and/or developed, or the extent of any subsequent exploration and development on either a temporal or spatial scale, it is not possible to provide definitive air quality impacts through dispersion modeling or another acceptable method at this time. The BLM will request or develop an exploration and development emissions inventory with project-specific information at the time that BLM receives a development proposal and performs a site-specific NEPA analysis. The following per-well emissions rates were developed using project proponent provided information for oil and gas development near the proposed lease parcels. Following the per-well emissions table is discussion regarding potential new Federal oil and gas development and sources that could begin operation as a result of new oil and gas development on the proposed lease parcels, based on recent oil and gas projects for the area. The construction / development emissions rates in the following table are for all pre-production related activities including well-pad, access road and pipeline construction, drilling and completion activities and all related traffic. The production emissions rates are post-development and represent equipment and activities including stationary engines, product stream components, pneumatics, heaters, tanks, maintenance activities and all related traffic.

Table 4: Typical New Well Emissions (TPY)*

Parameter	PM ₁₀	PM _{2.5}	VOC	NO _x	CO	SO ₂	CO _{2e}	HAPs
Construction / Development (Per well)	2.63	0.77	4.09	12.35	9.65	0.37	17,356.8	0.19

Production** (Per well)	0.15	0.08	3.69	2.48	3.55	0.03	131,280.8	0.23
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*Weighted average based on 11 recent / new projects in the area of the parcels.

**CO₂e production emissions include down-stream combustion.

The 11 projects that were compiled to assess potential new oil and gas development and related emissions on the proposed parcels include four projects in the northeast Colorado ozone NAA totaling 133 new potential wells and seven other new oil and gas projects just north of the ozone NAA near Pawnee National Grasslands totaling 111 wells (potential ~ 244 new wells for all 11 projects). The per-well emissions rates shown in the table above are weighted average values where per-well emissions rates for projects with more wells have more “weight” for the values shown. The same weighted approach was used to determine average Federal mineral production percentage and for the four new projects in the ozone NAA, the weighted average fraction of Federal minerals for a new project / well is ~ 0.31 and for all 11 projects, the weighted average Federal mineral production fraction (fraction that Federal would have authority over / make decision for developing) is ~ 0.26; this shows that the majority of new oil and gas for these new projects is non-Federal. The recent projects that were included for this assessment include the Riverside MDP (ozone NAA), Greeley Directional (ozone NAA), East Pony Phase 2, Razor 33 CPB and Cottonwood Federal 07 projects. Seven of the proposed parcels are in the Pawnee National Grasslands area and only several (< 5) kilometers on average from locations of the new projects used for this assessment; the new projects located in the ozone NAA are also relatively close to the three proposed parcels located in the ozone NAA.

As shown in the table above, per-well NO_x emissions for the construction/development phase of a project are relatively high, and the potential impacts associated with construction/development phase NO_x emissions are usually a main focus for project-level assessments. These per-well NO_x emissions for the construction/development phase are driven primarily by large non-road engines for drilling and completion/fracking activities, and the following provides details for some of the different equipment and operations that have been implemented for recent projects in the ozone NAA area near the proposed parcels. Note that there were several distinct differences in equipment / operations for the operators.

- Project with relatively large number of wells (> 50 wells but typical NAA project < 20 wells) for project uses Tier 4 development (frac) related engines at only 4 days of operation per well;

- Project that uses Tier 2 development (frac) related engines operating 6 days per well. Same project will power stationary compressor engines using electricity from traditional power source.
- Two - ozone NAA area projects drill rig (spud, primary, completion) engines powered by electricity from traditional power source (not onsite generator); project uses Tier 2 frac engines at 8 days per well.

The following table and discussion provide supplemental oil and gas projections information for this assessment.

Table 5: Parcel Projections

Parcel ID	RGFO RFD*	Ozone NAA	Parcel Acreage
8373	Moderate : 5 <10 wells per township	YES	1.49
8405	Moderately High : 10-20 wells per township	YES	80
8407	High : 30-50 wells per township	NO	80
8409	High : 30-50 wells per township	NO	120
8406	Moderately High : 10-20 wells per township	YES	160
8412	High : 30-50 wells per township	NO	320
8410	High : 30-50 wells per township	NO	315.64
8411	Moderately High : 10-20 wells per township	NO	320
8347	High : 30-50 wells per township	NO	320
8408	Moderately High : 10-20 wells per township	NO	456.44
8343	Very Low : < 1 well per township	NO	1160

8341	Very Low : < 1 well per township	NO	1883.84
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*Based on RGFO 20-year RFD (2012) projections

The latest RGFO 20-year RFD (2012) describes both Federal and non-Federal estimated new oil and gas development projections on a township wide basis (approx. 23,040 acres). Between 2012 and the date of this assessment (August, 2018), there has not been high levels of oil and gas development in the townships where the parcels are located, and since the latest RGFO RFD 20-year projections are for year 2013 out through year 2032, it is reasonable to assume that most of the new oil and gas resources in these townships have not yet been developed. That said, as the largest parcel for this Lease Sale is approximately 456 acres, and townships are approximately 23,040 acres, it would be unreasonable to assume that all of the remaining oil and gas potential for the townships would be developed on these relatively small parcels in the moderately high to high oil and gas potential development areas with no other new oil and gas development to occur on the remaining lands. Nor would it be reasonable to assume that the level of potential oil and gas development on the small parcels would be proportionate to the size of a township, as it is likely that development would be clustered (multiple wells per pad) similar to recent projects in the area (as described above, there are ~ 244 new oil and gas wells for the 11 new projects that were compiled for this assessment). The size (number of wells, etc.) of new oil and gas projects on the proposed lease parcels would likely be similar to other projects in the area, with a similar Federal mineral percentage of total (Federal and non-Federal) minerals extracted (as described above, weighted average Federal mineral percentage for all 11 recent projects ~ 26%).

Projecting the number of potential new Federal wells for any proposed lease parcel (over the remaining life of the 20-year RFD) in a moderate, moderately high or high oil and gas potential area would be highly uncertain, as it would consider several factors including the size of the parcel relative to the township, the average number of new wells and the Federal minerals production percentage for a typical oil and gas project for the area, and how many of these typical projects could be developed on a parcel over the course of the RFD. A reasonable RFD for new Federal oil and gas development for each of the proposed parcels in the moderate, moderately high or high RFD areas is likely greater than one and much less than the overall total (Federal and non-Federal) for the township. Furthermore, with respect to estimating reasonable foreseeable annual emissions based on RFD for new oil and gas, all the factors described above would have to be considered in addition to the ranges of equipment and operations for new oil and gas projects in the area and the number of “typical” new oil and gas projects that could be developed in a single year. In the last few years, BLM Colorado has approved new Federal oil

and gas development for the area, but the number of new projects developed annually has varied in relation to several factors including gas/oil prices.

Project-Level Near-Field Screening:

Aerial images and GIS were used to determine whether sensitive near-field receptors (residence, school, business, hospital, etc.) exist (or likely to exist) near the proposed lease parcels. The following table lists each parcel and screening-level information for future near-field impacts analyses:

Table 6: Near-Field Screening Assessment

Parcel ID	Near-Field Assessment
8373	Two small parcels at Riverside Res.; southern parcel ~ 0.7 miles from nearest receptor, eastern parcel ~ 0.8 mile from nearest receptor; additional near-field analysis maybe needed depending on project-specific emissions levels.
8405	Closest sensitive receptor is approximately 1.5 miles southeast of parcel; additional near-field analysis not likely needed due to distance to receptor.
8407	Closest sensitive receptor is approximately 0.6 miles due south of the parcel and there no other receptors in the immediate area; additional near-field analysis maybe needed depending on project-specific emissions levels.
8409	Closest sensitive receptor is approximately 0.85 miles southwest of the parcel and there are no other receptors in the immediate area; additional near-field analysis maybe needed depending on project-specific emissions levels.
8406	Closest sensitive receptor is approximately 1.3 miles southeast of parcel; additional near-field analysis not likely needed due to distance to receptor.
8412	There are two sensitive receptors approximately 0.5 miles from parcel; one due west and other southwest of parcel; additional near-field analysis maybe needed depending on project-specific emissions levels.
8410	There are two sensitive receptors approximately 0.5 miles from parcel; one northeast and other southeast of parcel; additional near-field analysis maybe needed depending on project-specific emissions levels.

8411	The are four sensitive receptors surrounding the parcel; one ~ 0.75 miles to the west/southwest, one ~ 0.9 miles to the south/southeast, one ~ 0.65 miles to the east and one immediately to the north/northeast; additional near-field analysis likely needed but will depend on project-specific emissions levels.
8347	There are two sensitive receptors in the vicinity of the parcel; one ~ 0.4 miles to the east and one immediately to the north/northwest of the parcel; additional near-field analysis likely needed but will depend on project-specific emissions levels.
8408	There are four separate pieces for this parcel ID; from nw to se, parcel 1 - sensitive receptors (rec) surround parcel, ~ 0.9 miles to north, 0.6 miles to se; parcel 2 - one rec ~ 0.6 miles sw; parcel 3 - two rec ~ 0.4 miles sw and ~ 0.9 miles to se; parcel 4 - one rec ~ 0.9 miles to ne; additional near-field analysis likely needed but will depend on project-specific emissions levels and specific locations of new emissions sources (which parcel piece, etc.).
8343	There are two separate pieces for this parcel ID, and no sensitive receptors in immediate area; additional near-field analysis not likely needed due to distance to nearest receptor.
8341	There is a sensitive receptor approximately 0.8 miles southeast of the parcel; additional near-field analysis not likely needed due to distance to receptor and oil and gas potential for the area.

As shown in the table above, there are several parcels where refined near-field project-level analysis maybe needed depending on the air pollutant emissions levels for new proposed oil and gas development on the parcels. The parcels with the highest probability of needing refined project-level near-field assessments for new oil and gas development are: 8411 and 8347 since there are receptors immediately adjacent to the proposed parcels. The parcels with the lowest probability of needing refined project-level near-field assessments for new oil and gas development are: 8405, 8406, 8343 and 8341 since there are not any sensitive receptors in the area of the parcels and / or the oil and gas development potential for the area is “very low”. This initial screening is based on emissions magnitude and distance to receptor correlation information from previously completed modeling analyses.

General Conformity:

As described in the Affected Environment section, three of the nominated lease parcels are located within a designated ozone non-attainment area (NAA) under the Clean Air Act. The

BLM therefore is undertaking measures to comply with the CAA conformity requirement set forth in 42 U.S.C. § 7506. The BLM has evaluated the proposed lease sale in accordance with the provisions of 40 CFR Part 93, Subpart B. Based on a review of 40 CFR § 93.153(c), BLM has determined that the requirement to perform a full conformity determination does not apply to the proposed action for the following reasons:

- Under 40 CFR 93.153(c)(2), a conformity determination is not required for actions “which would result in no emissions increase or an increase in emissions that is clearly de minimis.” Leasing does not authorize emissions generating activities, and therefore does not directly result in an emissions increase.
- A conformity determination also is not required “where the emissions (direct or indirect) are not reasonably foreseeable.” 40 CFR § 93.153(c)(3). While this EA provides information for the factors that should be considered to determine a reasonable estimate of foreseeable emissions for the proposed lease parcels and overall for the region (estimates made for cumulative CARMMS modeling and GHG and Climate Change assessment) for purposes of NEPA cumulative impacts analysis, it does not have specific information about whether or how the specific parcel under consideration will be developed during the initial 10 year lease period, such that a more precise emissions inventory could be reasonably estimated and compared to the thresholds provided in 40 CFR § 93.153(b). An onshore lease sale is analogous to the example provided in 40 CFR § 93.153(c)(3)(i), “Initial Outer Continental Shelf lease sales which are made on a broad scale and are followed by exploration and development plans on a project level.” Similarly, development of an onshore lease requires subsequent BLM review and NEPA analysis of a specific development proposal. Information provided earlier in this EA shows that there are several factors to consider for estimating potential emissions that are highly variable depending on the project, and although ranges of potential oil and gas production and emissions are used for analysis and discussion in this EA, “reasonably foreseeable emissions” are not definitive until the BLM receives actual plans of development (i.e. APDs).
- Furthermore, 40 CFR § 93.153(d) provides, “[n]otwithstanding the other requirements of this subpart, a conformity determination is not required for:
 - The portion of an action that includes major or minor new or modified stationary sources that require a permit under the new source review (NSR) program (Section 110(a)(2)(c) and Section 173 of the [CAA]) or the prevention of significant deterioration program (title I, part C of the [CAA]).” 40 CFR 93.153(d)(1). It is uncertain at this time, but highly likely, that several project

design features, for example equipment sets, such as tanks, separates, compressions engines, pump jacks, and dehydration units, will require at least a minor new source review (permit) prior to constructing such facilities to implement any subsequent development proposals. Emissions from such permitted facilities would not be subject to the general conformity analysis provisions. BLM expects that much of the new oil and gas development that may occur on the proposed lease parcels would use similar equipment and processes that will require similar permitting to the recent oil and gas development projects for the area. For example, among the 11 recent projects discussed above, most include permitted storage tanks and stationary engines; several also have permitted heaters and production stream components.

For all of these reasons, a conformity determination is not required for the sale of the leases under consideration.

Future Analysis:

Substantial emission-generating activities cannot occur without further BLM analysis and approval of proposals for exploration and development operations. The BLM will assess project-specific impacts on air resources during the parcel development (permitting) stage, including potential impacts to visual and other air quality impacts to nearby Class I areas. The more detailed information available at that stage will allow the BLM to more accurately estimate emissions and determine potential impacts to air quality. BLM Instructional Memorandum CO-2015-009 describes methods for development-stage air-quality impacts analysis. Based on the outcome of our future analysis, approval of these activities may be subject to conditions of approval to address air pollutant impacts and climate change pollutants as appropriate.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

This lease sale, when combined with the past, present, and reasonably foreseeable future actions may (through future development), contribute incrementally to the deterioration of air quality in the region. At present, any future potential cumulative impact is speculative, given that the pace, place, and specific equipment configurations of such development are unknown. Development of fluid minerals on these leases would result in additional surface disturbance and emissions during drilling, completion, and production activities. The severity of these incremental impacts could be elevated based on the amount of contemporaneous development (either Federal or private) in surrounding areas. While recognizing the uncertainties described above, BLM has

used mapping and a modeling study to broadly estimate the potential cumulative impacts to air quality from leasing and development of the parcels under consideration in light of ongoing oil and gas exploration and development in the area.

To examine potential cumulative air quality impacts from activities that it authorizes, this EA will use Colorado Air Resources Management Modeling Study (CARMMS) second iteration (CARMMS 2.0) modeling results. The study includes assessment of statewide impacts of projected oil and gas development (both Federal and fee (i.e. private)) out through year 2025 for three development scenarios (low, medium, and high). Projections for development are based on either the most recent FO Reasonably Foreseeable Development (RFD) document (high scenario), or by projecting the current 5-year average development pace forward through 2025 (low scenario). The medium scenario includes the same well count projections as the high scenario, but assumes restricted emissions, whereas the high and low scenarios assume current development practices and existing emissions controls and regulations (as of year 2015). Each FO was modeled with the source apportionment (SA) option, meaning that incremental impacts to regional ozone and AQRVs from development within each field office are parsed to better understand the significance of development in each area on impacted resources and populations. The RGFO was split into four SA areas, since the field office is so large. The CARMMS project leverages the work completed by the Intermountain West Data Warehouse, and the base model platform and model performance metrics are based on those products (2011). The complete report and associated data is available on our website at:

<https://www.blm.gov/programs/natural-resources/soil-air-water/air/colorado>

The BLM continually tracks authorized oil and gas activity to determine which CARMMS scenario would be most appropriate to estimate air resource impacts based on the source apportionment area's cumulative federal development and total production. Although the predicted impacts will be based on future modeling results (year 2025), the differences in the impacts between the scenarios provide insight into how mass emissions impact the atmosphere on a relative basis, and are thus useful for making qualitative correlations for the tracked emissions levels.

On a cumulative basis, overall Federal oil and gas in Colorado is tracking close to the CARMMS 2.0 low scenario, with higher than CARMMS 2.0 low scenario projected new oil and gas development levels occurring in the DJ Basin (CARMMS 2.0 - Areas 1 [ozone NAA] and 3 [~DJ Basin outside ozone NAA]) of RGFO and within the Colorado River Valley Field Office (two typically high oil and gas development areas). The cumulative maximum air quality and AQRV impacts described in this EA use the CARMMS 2.0 high scenario modeling results and

are far greater than those expected to occur in the near future based on observations of actual new oil and gas development trends (because no area in Colorado is outpacing the high development scenario and Colorado on a statewide basis is tracking below the CARMMS 2.0 high development scenario).

Table 7: CARMMS 2.0 High Scenario New Federal Emissions (TPY)*

Source Area	PM ₁₀	PM _{2.5}	VOC	NO _x	SO ₂
RGFO	2,814	413	6,178	2,780	4
Colorado	6,518	1,543	33,514	23,714	1,231

*Year 2025 emissions for new Federal oil and gas development years 2016 through 2025.

Table 8: CARMMS 2.0 High Scenario Annual Nitrogen Deposition - RGFO

CARMMS Scenario	Max Class I kg/ha-yr	Class I Area	Max Class II kg/ha-yr	Class II Area
High	0.0003	Rocky Mountain NP	0.0022	Lost Creek Wilderness

Cumulatively, all new Federal oil and gas developed in Colorado through year 2025 for the CARMMS 2.0 high scenario could contribute up to 0.0637 kg/ha-yr of nitrogen deposition annually at the nearby Lost Creek Wilderness (maximum CARMMS 2.0 high scenario predicted annual nitrogen deposition rate for all new Colorado-wide oil and gas development through year 2025 at Great Sand Dunes NP is ~ 0.044 kg/ha-yr). At Rocky Mountain NP, the maximum Colorado Federal cumulative annual nitrogen deposition rate could be approximately 0.0629 kg/ha-yr for the CARMMS 2.0 high scenario. Overall (for all sources) cumulatively, CARMMS 2.0 predicts 0.56 kg/ha-yr and 0.32 kg/ha-yr overall improvements from baseline year 2011 through year 2025 for the high scenario for Rocky Mountain NP and Great Sand Dunes NP, respectively.

Table 9: CARMMS 2.0 High Scenario Visibility Changes - RGFO

CARMMS Scenario	Max Class I dv	Class I Area	Days > 0.5 dv	Days > 1.0 dv	Max Class II dv	Class II Area	Days > 0.5 dv	Days > 1.0 dv
High	0.13977	Rocky Mountain NP	0	0	0.12031	Florissant Fossil Beds NM	0	0

Cumulatively, all new Federal oil and gas in Colorado for the CARMMS 2.0 high scenario could contribute up to 0.29 dv of visibility changes at the Great Sand Dunes National Park (maximum RGFO only predicted potential visibility changes at Great Sand Dunes NP ~ 0.03 dv). At Rocky Mountain NP, the CARMMS 2.0 predicted potential visibility change value for new Colorado Federal O&G (years 2016 through 2025) is approximately 0.30 dv. Overall (for all sources) cumulatively, CARMMS 2.0 future year 2025 worst (dirtiest) 20% days cumulative visibility metric value (deciview – dv) for Rocky Mountain NP is 11.93 dv (not improvement – note that new BLM Colorado Federal O&G development through year 2025 modeled to contribute 0.04 dv of the overall cumulative value) and is 11.43 dv (improvement) for Great Sand Dunes NP.

For all of the metrics outlined above, new Federal oil and gas development within the RGFO through year 2025 for the CARMMS 2.0 high scenario (highest level of new oil and gas development years 2016 through 2025) would not cause significant impacts to air resources. In addition, overall cumulatively, air quality and AQRV improvements (ozone in the Denver – Front Range area, etc.) are expected at many locations around the Region. The following plots show CARMMS 2.0 modeled year 2025 changes from baseline year 2011 conditions for ozone and PM_{2.5}, respectively.

Figure 2: CARMMS 2.0 High Scenario – Ozone - Modeled Year 2025 Change from Baseline Year 2011 Conditions

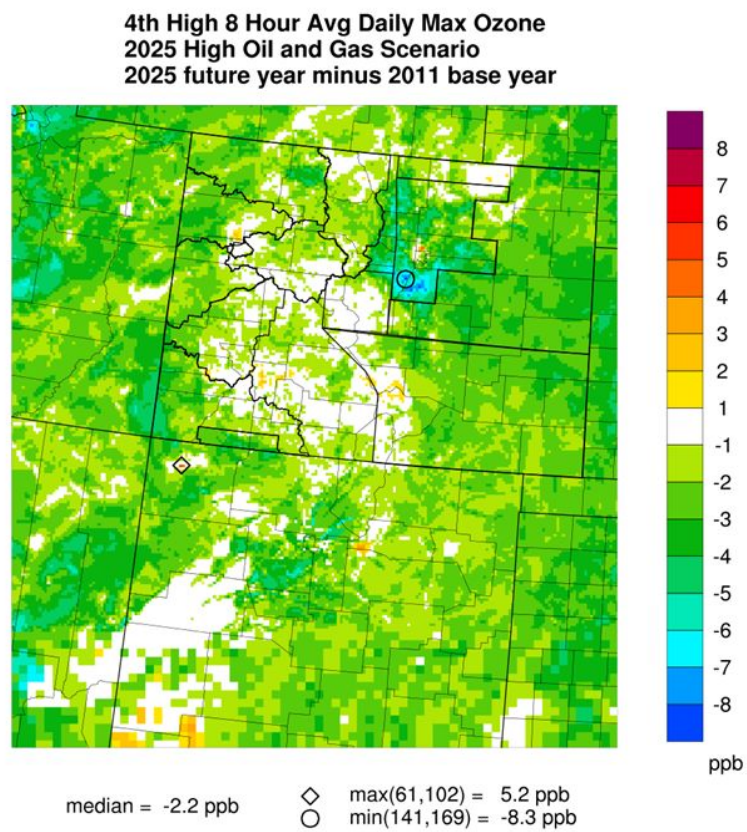
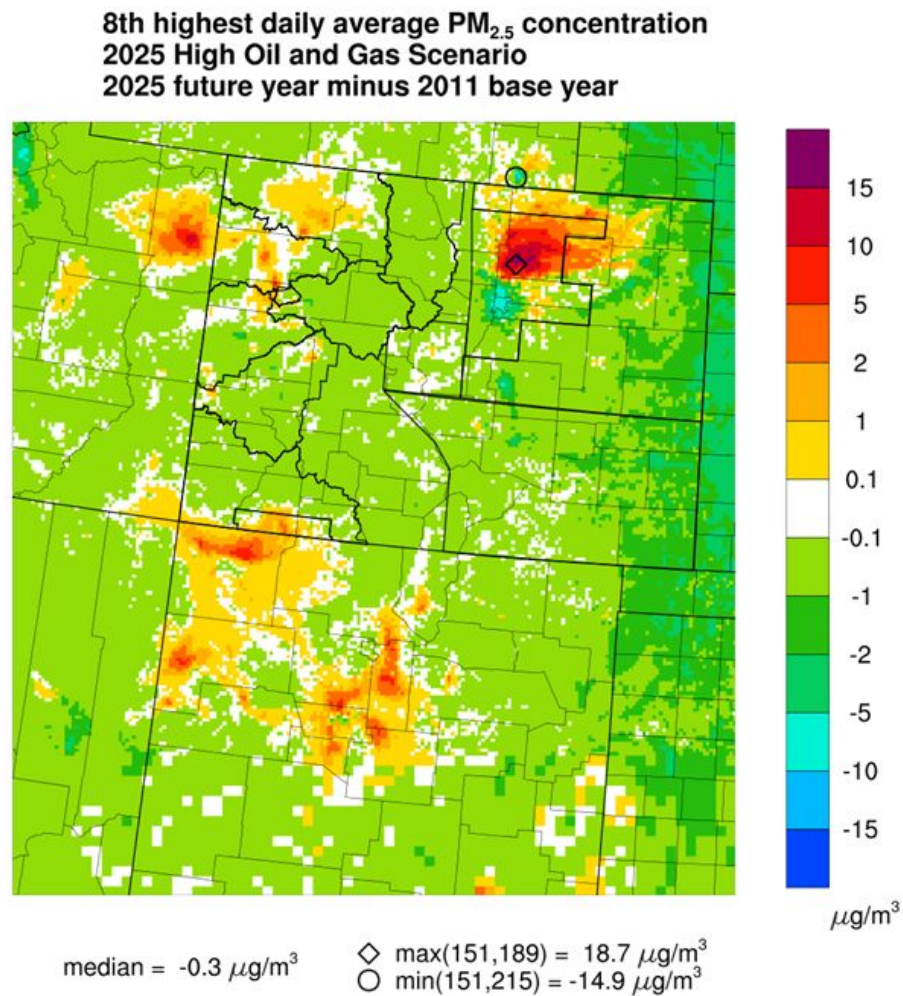


Figure 3: CARMMS 2.0 High Scenario – PM_{2.5} - Modeled Year 2025 Change from Baseline Year 2011 Conditions



GHG and Climate Change:

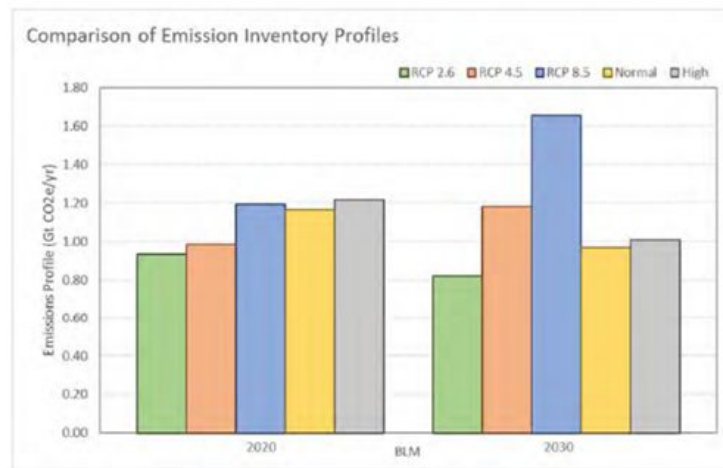
The online Annual Report is incorporated by reference for discussion of GHG emissions and Climate Change. Additional information can be found in the “Projected Emissions for Analysis”, “Projected Climate Impacts” and “The Carbon Budget” sections of the Report (<https://www.blm.gov/programs/natural-resources/soil-air-water/air/colorado>).

In addition, information from BLM’s Greenhouse Gas and Climate Change Report (BLM, 2017) is incorporated to describe potential GHG emissions for various future years and energy development scenarios. For that study, GHG emissions were calculated for two energy

development scenarios (“normal” rate of energy development and consumption, and an above normal energy production and consumption) for projected years 2020 and 2030 for each BLM State including Colorado. GHG emissions estimates for Federal and non-Federal energy related development (i.e. upstream and midstream) / consumption (i.e. downstream) were developed for coal, oil, natural gas and natural gas liquids. This Report used coal, oil and natural gas production and consumption data presented in the Energy Information Administration’s (EIA) 2016 Annual Energy Outlook (AEO) to determine growth factors to estimate 2020 and 2030 normal / high inventories. The following summarizes the projected future years GHG emissions and trends for Colorado Federal resources:

- Colorado Federal Emissions due to oil production and end-use consumption are projected to remain almost static (not much change) from baseline year (2014) to future years (2020 and 2030) with a slight decrease in GHG emissions for both the normal and high energy scenarios.
- Colorado Federal Emissions due to natural gas production and downstream consumption are projected to increase into year 2030 for both the normal and high energy projection scenarios from 42.91 MMTCO₂e in base year 2014 to 44.55 and 45.03 MMTCO₂e in the 2030 normal and high growth scenarios, respectively.
- Colorado Federal Emissions due to natural gas liquids are projected to decrease from baseline year 2014 to projected year 2030 by approximately 25-30% for both energy projection scenarios.

The Report examined the contribution of GHG emissions from coal, oil, natural gas and LNG for the BLM States in years 2020 and 2030 for both the normal and high production scenarios. Comparing these emissions to the derived BLM emissions profile under the Intergovernmental Panel on Climate Change (IPCC) Representative Concentration Pathway (RCP [GHG concentration trajectory adopted by IPCC for its Fifth Assessment Report in year 2014]) scenarios, the calculated BLM / Federal emissions most closely track with RCP 8.5 in year 2020 and between RCP 2.6 and RCP 4.5 in year 2030 as shown in the following graph. Within the BLM emissions profile, the relative mixture of coal, oil and natural gas changes from baseline year to 2030. The dependence of coal is reduced, with increased usage of natural gas by year 2030.



In addition, the Golder Report (BLM, 2017) provides a supplemental “Understanding Future Climate Impacts” section and summarizes that projected changes in climate are driven by the cumulative emissions, not the emissions profile. When considering the cumulative emissions on a global scale, the sub-national emissions profile (by BLM as a whole, a BLM Field Office, etc.) is one of many emission contributions. Any single contribution on a sub-national scale is dwarfed by the large number of comparable national and sub-national contributors on a global scale. The best surrogate for understanding the potential impact of sub-national (i.e. RGFO, etc.) emissions on climate is the behavior of the BLM sub-national emissions relative to all the other contributors. If BLM operates under the business-as-usual scenario while all other contributors are reducing their emissions in line with RCP 2.6 (lowest IPCC radiative forcing scenario that will require substantial Global GHG emissions reductions), the relative contribution of BLM increases as the GHG emissions more closely resemble RCP 4.5 (higher radiative forcing / Climate Change impact scenario). If BLM operates under the decreased emissions scenario, keeping their reductions in line with RCP 2.6 like all the other contributors, the relative contribution of BLM remains similar to current contributions. If BLM operates under the decreased emissions scenario, while all other contributors are maintaining constant emissions (business-as-usual) or increasing emissions, the relative contribution of BLM greatly reduces (i.e. BLM’s GHG emissions footprint is small compared to other contributors). It is very unlikely that the global cumulative emissions will be strongly influenced by a single contributor (i.e. RGFO, etc.) at a national or sub-national scale. However, the individual behavior of each contributor, through their relative contribution, has the ability to influence which RCP global emissions most closely resembles, and therefore which climate change projections are most likely manifest towards the end of the century.

Potential Future Mitigation:

As noted above, substantial emission-generating activities cannot occur without further BLM analysis and approval of proposals for exploration and development operations. BLM may make its approval of these activities subject to conditions of approval (COA) addressing air pollutant emissions, as appropriate. Prior to approving development activities on a leased parcel, the BLM conducts a refined project-level analysis that considers the impacts of the operator's development plans for the lease, to the extent reasonably foreseeable. The BLM's analyses typically consider the emissions inventory for the proposal (including GHGs), and estimated emissions from other development on and outside the lease and other nearby emissions sources. Additional analyses (such as air dispersion modeling assessments) may be necessary. All operators must comply with applicable local, State and Federal air quality laws and regulations, including Colorado's strict emissions control regulations. BLM impose specific mitigation measures within its authority as COA, based on the review of site-specific proposals or new information about the impacts of exploration and development activities in the region.

Currently, Colorado has some of the strictest emissions regulations in the U.S. for the oil and gas industry not leaving much "available" emissions to reasonably control. The following are examples of some of the additional GHG emissions controls that could be implemented for new Federal O&G development that may occur on the Lease Parcels, and an approximate reduction in future GHG emissions that could result for the additional emissions control:

- A large fraction of CO₂ emissions for new O&G wells are associated with large O&G development related engines. NONROAD CO₂ emissions factors for large O&G development engines (drilling/completion) are projected to vary little over time even though new equipment technology generally results in cleaner engines, meaning that requiring O&G operators to develop new wells using Tier 4 engines would result in an almost negligible reduction in CO₂ emissions for new O&G well development.
- A large portion of CH₄ emissions for new O&G wells are associated with pneumatic devices. Implementing no-bleed devices (not feasible for all new oil and gas development) could result in a significant CH₄ emissions reduction. These type design features will be implemented (required by BLM) when feasible on a project-by-project basis.

It is reasonable to assume that BLM Colorado oil and gas related emissions development will follow the U.S.-wide emissions pathways/GHG emissions trends based on regulation/policy, or and it is reasonable to assume that Colorado Regulations will reduce Colorado-based emissions even more than other States in the U.S. due to increased oil and gas emissions control

requirements for Colorado. Additional (beyond State and Federal Regulations) mitigation requirements for oil and gas, and mining projects will be developed at the project-level stage when actual proposed actions are submitted to the BLM. BLM will continue to require that activities for projects follow best management practices and continue to encourage operators to control unnecessary GHG emissions using “common sense” and feasible techniques including reducing vegetation clearing when not all is needed (offsets CO2 emissions), reducing truck idling, double-checking equipment where fugitive emissions could leak (this is also a State and Federal requirement for O&G operations), etc.

3.4.1.2 Minerals/Fluid

Affected Environment:

The twelve nominated parcels are located on the eastern plains of Colorado within the Royal Gorge Field Office boundary. The development potential according to the most recent reasonable foreseeable development scenario for the field office ranges from High (>30 -50 wells per township) to very low (< 1 well per township). Most of the parcels in Weld County range from Moderately High to High development potential. The parcels in Las Animas County are very low development potential (less than 1 well per township) based on the reasonable foreseeable development.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

Leasing of the parcels would allow for the development and recovery of oil and natural gas resources and help avoid potential drainage of federal fluid minerals from nearby non-federal wells. If development of the parcels takes place, it would result in the extraction and irreversible depletion of hydrocarbon resources from the targeted zones of the leases.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Should the leases be issued, there would be the potential for development resulting in draining these parcels of fluid minerals, which would add incrementally to the production of overall fluid minerals which may be taking place on non-federal leases, and contribute to the domestic supply of crude oil and natural gas.

Potential Future Mitigation:

None.

3.4.1.3 Hydrology/Water Quality

Affected Environment:

The proposed parcels are located on the eastern plains of Colorado, in Las Animas and Weld County.

Surface Water: With the exception of the T4N, R61W parcels, there appears to be no permanent surface water on any of the parcels. Drainages are present within some of the parcels, which likely have intermittent water flowing through them depending on weather.

The proposed lease parcels located in Las Animas County are in the Arkansas watershed basin. The Arkansas River originates in the mountains near Leadville, Colorado, and flows south and east, until it joins the Mississippi River in Arkansas. The parcels in Weld County are found in the South Platte watershed basin. The South Platte River drains a 28,000 square mile area in Colorado, Wyoming, and Nebraska. The main stem of the South Platte originates in the South Park Basin, and drains a large portion of the Front Range. The river flows approximately 200 miles from Greeley, Colorado to the confluence with the North Platte River in Western Nebraska.

Ground Water: The Ogallala Formation can be found within some of the proposed parcels in Weld County: the Ogallala comprises a portion of the High Plains aquifer. The High Plains aquifer underlies an area of about 174,000 square miles that extends throughout parts of Colorado, Nebraska, Kansas, New Mexico, Oklahoma, South Dakota, Texas and Wyoming. The aquifer is the principal source of water in one of the major agricultural areas of the United States. In eastern Colorado, the High Plains aquifer has an average saturated thickness of about 75 feet, and the average transmissivity is about 4,500 square feet/day. The base of the aquifer is underlain by the Pierre shale formation that is generally considered impermeable, except for some sands near the top of the Pierre shale that can contain usable water. Dissolved solids concentration found in the water of the High Plains aquifer in eastern Colorado is generally less than 500 mg/l but exceeds 1,000 mg/l in some areas. Potential well yields of more than 750 gpm may be obtainable in the eastern Colorado portion of the aquifer, but many wells yield far less. (USGS 1995). The proposed lease parcels in Las Animas County and several of the proposed parcels in Weld County are located above the Dakota-Cheyenne aquifer. The Dakota-Cheyenne group is an assemblage of sandstones, shales, and mudstones of lower Cretaceous age. Thirty-one percent of Colorado's oil and 25 percent of Colorado's gas has been produced from the Dakota group; however, the group is water bearing when it is close to the surface. The group ranges from 100 to 500 feet thick, and saturated zones are highly variable. Water from the

aquifer is used for agricultural and commercial purposes; however, it is unreliable as a source for high volume-production. Domestic yields commonly range from 5 to 50 gallons per minute, and some irrigation wells in Baca County yield more than 1,000 gallons per minute. Total dissolved solids (TDS) typically range from 200 to 25,000 milligrams per liter, and is dependent on the geological composition of the unit. Most of the proposed parcels in Weld County are also located above the Fox Hills Aquifer, the lowermost of the Denver Basin aquifer system. The Fox Hills Formation is Upper Cretaceous in age, and is composed of two thick sandstone units. Aquifer thickness is variable, but is generally 0-200 feet thick beneath the proposed parcels. Typical flow is between 100 and 150 gpm, and the aquifer is typically under artisan pressure. Water found in the Fox Hills is typically of good quality, with an average TDS of 662 mg/L.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The act of leasing the parcels for oil and gas development would have no direct impact on water resources; however activities at the exploration and development stage could have impacts to water quality and quantity. The magnitude and location of direct and indirect effects cannot be predicted with accuracy until the site-specific APD stage of development, at which time groundwater resources will be analyzed. No lease stipulations for the proposed parcels specifically address either surface or groundwater quality, however there are regulations in place that require protection of water quality. If these parcels are developed, operators would be required to adhere to state and federal regulations, and proper site specific design features. Therefore, development is not expected to result in waters not meeting quality standards. Similar to water quality, water quantity impacts cannot be predicted with accuracy until the site specific APD stage. Many factors, such as well type, depth, the formation being drilled, and the use of recycled water, influence the amount, timing of water used to construct, drill and complete a well. It is also not known at this point how many wells associated with these parcels may be drilled. Water usage is regulated by the State of Colorado's water rights system and operators would need to obtain a source of water approved by the state for the intended use.

Surface Water: Impacts to surface water resources would be associated with the surface disturbance from the construction of roads, pipelines, well pads, and power lines. Specific impacts could include increased soil movement due to vegetation removal and soil compaction caused by construction that would reduce the soil infiltration rates, in turn increasing runoff during precipitation events. Downstream effects of the increased runoff may include sedimentation and changes in downstream channel morphology such as bed and bank erosion or accretion. Impacts would be greatest shortly after the start of the activity and decrease over time. These impacts are expected to be mitigated by the implementation of design features and

conditions of approval (COA) including stormwater control measures that would slow runoff and capture sediment, and require proper revegetation at the interim and final reclamation phases. Construction and reclamation activities would be in accordance with BLM Gold Book standards where applicable. These measures would be applied at the APD stage to address site specific conditions based on submitted surface use plans of operations as required by the BLM. In addition the State of Colorado requires stormwater protection plans for disturbances greater than one acre. Oil, saltwater or other fluids, accidentally spilled or leaked during the drilling, completion or production process could result in the contamination of both ground and surface waters; however, the BLM and State of Colorado have regulations that help to minimize the likelihood of contamination of water resulting from spills, and require effective clean-up of spills that may occur. The state also regulates the disposal, remediation and recycling of waste generated by oil and gas development to ensure that water resources are not impacted. Authorization of development projects would be further analyzed at the APD stage and permits would require full compliance with BLM directives and state regulations for surface and groundwater protection.

Ground Water: If the proposed parcels are drilled, wells would most likely pass through useable groundwater. Potential impacts to groundwater resources could occur if proper cementing and casing programs are not followed. This could include loss of well integrity, surface spills, or loss of fluids in the drilling and completion process. Without proper casing and cementing of the well bore, it is possible for chemical additives used in drilling and completion activities to be introduced into useable water (TDS<10,000 ppm) zones. However, BLM Onshore Order #2 requires protection of useable groundwater through proper drilling, cementing and casing procedures. When an operator submits an APD, the operator must submit a site specific drilling plan. The BLM petroleum engineer reviews the drilling plan, and based on site specific geologic and hydrologic information, ensures that proper drilling, casing and cementing procedures are incorporated in the plan in order to protect useable groundwater. This isolates useable water zones from drilling, completion/fracturing fluids, and fluids from other mineral bearing zones, including hydrocarbon bearing zones. Conditions of approval are attached to the APD, if necessary, to ensure groundwater protection. At the end of the well's economic life, the operator must submit a plugging plan which undergoes review by the BLM petroleum engineer prior to well plugging, which ensures permanent isolation of useable groundwater from hydrocarbon bearing zones. BLM inspectors ensure planned procedures are properly followed in the field. The State of Colorado also has regulations for drilling, casing and cementing, completion and plugging to protect freshwater zones.

If the parcels are developed, wells within the parcels may be completed using hydraulic fracturing techniques. Hydraulic fracturing is intended to change the physical properties of producing formations by increasing the flow of water, gas, and/or oil around the wellbore, resulting from the introduction of water, proppant (sand) and chemical additives into the producing formations. Types of chemical additives used in completion activities may include acids, hydrocarbons, thickening agents, gelling agents, lubricants, and other additives that are operator and location specific. The largest components in hydraulic fracturing fluid are water and sand. The state of Colorado requires operators to publicly disclose all chemicals in hydraulic fracturing fluids used on all wells completed in Colorado using hydraulic fracturing techniques on “fracfocus,” a database available to the public online at <http://fracfocus.org/>.

In general, there is some public concern over potential increased seismicity associated with fracking and wastewater injection. Water injection, impoundment of reservoirs, surface and underground mining, and withdrawal of fluids from the subsurface have long been linked to increased seismicity (Ellsworth). More than 100,000 wells have been fracked in recent years, and microearthquakes with magnitudes less than 2 are routine in the fracking process. There are millions of naturally occurring microearthquakes per year, which are too small to be felt by humans (USGS). The largest earthquake induced by humans was magnitude 3.6, which is very unlikely to cause damage (Ellsworth). Larger mid-continent earthquakes, like the 2016 magnitude 5.6 Oklahoma earthquake, may be linked to water disposal wells (Ellsworth). The disposal wells may weaken pre-existing faults by elevating pore fluid pressure, causing slippage. However, only a small percentage of the 30,000 existing water disposal wells are problematic: those that inject a large amount of fluid and communicate with faulting in basement rock are most problematic (Ellsworth). The state of Colorado regulates the amounts of water injected, and the geologic formations into which they are injected. The proposed parcels are in areas the USGS has determined as very low risk for damage occurring from natural and induced earthquakes (Less than 1 percent).

If contamination of aquifers from any source occurs, changes in groundwater quality could impact springs and water wells that are sourced from the affected aquifers. BLM Onshore Order #2 requires that the proposed casing and cementing programs shall be conducted as approved in the APD to protect and/or isolate all usable water zones from other geologic formations (including the hydrocarbon producing zones), and any completion fluids introduced in the wellbore. In addition to BLM’s regulations to protect useable water zones, the Colorado Oil and Gas Conservation Commission (COGCC) regulates drilling and hydraulic fracturing, and has extensive operational requirements in place to protect ground (and surface) water. Examples include casing and cementing programs, comprehensive spill clean-up requirements, regulation

of waste management, groundwater monitoring, and offset well evaluation for horizontal wells that will be hydraulically fractured. This policy requires operators proposing to hydraulically fracture a horizontal well evaluate existing wells that penetrate the target formation, within 1,500' of the wellbore of the proposed well to be fracture treated, ensuring these offset wells have adequate zonal isolation. If offset wells are deemed to have inadequate zonal isolation, the operator must adequately remediate the well with casing and cementing improvements, or properly plug the offset well. This is to prevent fluid from migrating along offset well bores into freshwater zones from zones that are hydraulically fractured. The wellheads of offset wells are also evaluated and upgraded, if necessary, to ensure that any pressure increase in the wellbore due to the fracture treatment will not result in a spill at the surface, protecting surface water.

Requirements of Onshore Order #2 (along with adherence to state regulations) make contamination of groundwater resources highly unlikely. Surface casing and cement would be extended beyond usable water zones. Production casing will be extended and adequately cemented within the surface casing to protect other mineral formations, in addition to usable water bearing zones. These requirements ensure that drilling fluids, hydraulic fracturing fluids and produced water and hydrocarbons remain within the well bore and do not enter groundwater or any other formations.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect water quality. These activities may include: oil and gas development, residential and commercial development, grazing, farming, and mining. Potential development of these parcels would incrementally add an additional impact to water resources into the future.

Most of this impact would be phased in and lessened as new wells put on production undergo interim reclamation, older wells are plugged, and those locations reclaimed. Overall, it is not expected that the leasing and possible future development of the parcels would cause long term degradation of water quality below state standards.

Water is used to drill and complete oil and gas wells and potential development would result in the use of water. The State of Colorado regulates water use within Colorado, including water used for oil and gas development. It is not known at the lease stage how many (if any) wells will be drilled on a given lease parcel, how many parcels will be developed, what source would be used for the water and how much water may be used for each potential well. Factors such as the type of well to be drilled (vertical, directional or horizontal), method of well completion (hydraulic fracturing, acidizing etc.) total measured depth of well, and geologic conditions of the

formations all determine how much water may be required for each well. This information is not known at the lease stage, but will be analyzed at the APD stage. The act of oil and gas leasing does not directly result in any water use.

Potential impacts to groundwater at site specific locations are analyzed through the NEPA review process at the development stage when the APD is submitted. This process includes geologic and engineering reviews to ensure that cementing and casing programs are adequate to protect all downhole resources.

Potential Future Mitigation:

Reclamation practices along with additional drilling and construction requirements (Onshore Order #2, engineering reviews, stormwater management features) at the APD stage are adequate to protect water resources on the parcels being proposed for leasing. Additional site specific mitigation measures would be analyzed and may be required at the APD stage, which could include moving a pad up to 200 meters to avoid sensitive areas, or adding site specific BMPs as required.

3.4.2 Biological Resources

3.4.2.1 Migratory Birds

Affected Environment:

BLM Instruction Memorandum No. 2008-050 provides guidance towards meeting the BLM's responsibilities under the Migratory Bird Treaty Act (MBTA) and Executive Order (EO) 13186. The guidance emphasizes management of habitat for species of conservation concern by avoiding or minimizing negative impacts and restoring and enhancing habitat quality.

The dominant habitat in this physiographic area is shortgrass prairie. Shortgrass is dominated by two low-growing warm-season grasses, blue grama and buffalo grass; western wheatgrass is also present, along with taller vegetation including widespread prickly-pear cactus and yucca, and cholla in the south. Sandsage prairie is found where sandy soils occur, and is dominated by sand sagebrush and the grasses sand bluestem and prairie sand-reed. Mixed grass (needle-and-thread, side-oats grama) and tallgrass (big bluestem, little bluestem, switchgrass) communities occur locally.

A second habitat in this physiographic area is lowland riparian. In the shortgrass prairie, lowland riparian communities occur along the few stream and river courses. Riparian vegetation

is dominated by plains cottonwood, willow shrubs, and introduced species such as Russian-olive and Chinese elm. Trees were uncommon features of the shortgrass prairie before European settlement; development of woody vegetation has been facilitated in historical times by alteration of natural river flow regimes, a result of irrigation drawdown and reservoir construction for flood control.

The following birds are listed on the US Fish and Wildlife Service Birds of Conservation Concern (BCC) – 2008 List for BCR 16-Southern Rockies/Colorado Plateau and BCR 18-Shortgrass Prairie and may occur within the proposed lease area: mountain plover, upland sandpiper, Bell's vireo, Sprague's pipit, lark bunting, McCown's longspur, chestnut-collared longspur, grasshopper sparrow, northern harrier, and prairie falcon. These species have been identified as species that may be found in the project area, have declining populations and should be protected from habitat alterations.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

Leasing will have no impact on migratory bird individuals, populations or habitat. If leases are developed, surface disturbing activities, such as road building or pad and pipeline construction will destroy existing habitat. Surface disturbing activities during the nesting season could interfere with habitat used for breeding activity or cause nesting failure. Noise and human activity generated during construction, drilling, and production phases will likely result in a larger impact footprint than the disturbance footprint alone.

Migratory birds may be burned, entrapped, and/or killed by exhaust vents, heater-treaters, flare stacks, and open pipes, etc., as a result of development related infrastructure. An increase in activity, i.e. road traffic, will likely result in an increase in vehicular collisions with migratory birds. If oil and/or gas are located in economically feasible quantities, it is likely additional development will occur.

Appropriate lease stipulations to protect some migratory birds and their habitats were attached to parcels and described in Attachments A and C. Further, at the field development and APD stage it is standard procedure to include a COA on all APDs that protects birds through measures to prevent destruction of nests and effectively preclude migratory bird access to, or contact with, reserve pit contents that possess toxic properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage, or other harmful features associated with development.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect migratory bird species. These activities include: oil and gas development, residential development, grazing, agriculture, mining and recreation. In areas where human development has previously modified the natural environment (i.e. agricultural, settlement, past oil and gas development) it is likely that migratory bird species richness and diversity have been compromised. New oil and gas development will likely cause an additive negative impact to most species of migratory birds currently present at the site. While the leasing of parcels will not compound these impacts, future oil and gas development may impose deleterious effects. Every parcel is unique and cumulative impacts will need to be addressed in the APD stage.

Potential Future Mitigation:

Consistent with the Migratory Bird Treaty Act (MBTA) and the Memorandum of Understanding between BLM and USFWS required by Executive Order 13186, BLM avoids actions, where possible, that result in a “take” of migratory birds.

Pursuant to BLM Instruction Memorandum 2008-050, to reduce impacts to Birds of Conservation Concern (BCC), no habitat disturbance (removal of vegetation such as timber, brush, or grass) is allowed during the periods of May 15 - July 15, the breeding and brood rearing season for most Colorado migratory birds. The provision will not apply to completion activities in disturbed areas that were initiated prior to May 15 and continue into the 60-day period.

An exception to this timing limitation will be granted if nesting surveys conducted no more than one week prior to vegetation-disturbing activities indicate no nesting within 30 meters (100 feet) of the area to be disturbed. Surveys shall be conducted by a qualified breeding bird surveyor between sunrise and 10:00 a.m. under favorable conditions.

Any secondary containment system will be covered in a manner to prevent access by migratory birds. The operator will construct, modify, equip, and maintain all open-vent exhaust stacks or pipes on production equipment to prevent birds and bats from entering and to discourage perching, roosting, and nesting. Production equipment includes, but may not be limited to, tanks, heater-treaters, separators, dehydrators, flare stacks, and in-line units. Any action that may result in a “take” of individual migratory birds or nests that are protected by MBTA will not be allowed.

Additionally, standard lease terms and conditions, which allow the BLM to move an operation up to 200 meters and delay operations for up to 60 day, may be implemented to protect valuable wildlife resources.

3.4.2.2 Special Status Species

Affected Environment:

Many BLM sensitive species (black-tailed prairie dog, swift fox, Townsend's big eared bat, common kingsnake, milk snake, massasauga, mountain plover, Brewer's sparrow, ferruginous hawk and bald and golden eagle) could potentially occur on parcels available for leasing.

All proposed lease parcels are subject to lease stipulation Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal species. Protective measures for these species will be applied, if necessary, at the APD stage and might include the need to move development pads, enforce timing limitations, enforce no surface occupancy restrictions, etc. Additional NEPA analysis will be completed as individual APDs are received for all the parcels identified in this document. Site specific field visits will be conducted as deemed necessary for those parcels that contain federally listed and sensitive species habitat.

Black-tailed prairie dog: The BLM lists the black-tailed prairie dog a sensitive species.

Black-tailed prairie dogs primarily occur in scattered colonies throughout the eastern plains of Colorado. In the summer of 2001, Colorado Parks and Wildlife inventoried colonies by utilizing aerial survey line transects throughout their historic range. Survey results suggest that statewide, approximately 631,000 acres of black-tailed prairie dog exist.

Swift Fox: Swift fox primarily occur within the short-grass and mixed-grass prairie on the eastern plains of Colorado. The distribution of swift foxes became severely reduced in concert with conversion of mid and shortgrass prairies to agriculture. Swift fox dens occur in ridges, slopes, hill tops, pastures, roadside ditches, fence rows and cultivated fields. Dens may be relatively close to human habitations and swift foxes occasionally den in human-made structures such as culverts.

Townsend's big-eared bat: The Townsend's big-eared bat occurs throughout the west and in Colorado. Habitat associations include: coniferous forests, deserts, native prairies, riparian communities, and agricultural areas. Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, with population centers occurring in areas dominated by exposed, cavity forming rock and/or historic mining districts. Townsends' habit of roosting on open surfaces makes it readily detectable, and it is often the species most frequently observed

(commonly in low numbers) in caves and abandoned mines throughout its range. It has also been reported to utilize buildings, bridges, rock crevices and hollow trees as roost sites.

Foraging associations include: edge habitats along streams, adjacent to and within a variety of wooded habitats. They often travel large distances while foraging, including movements of over 10 miles during a single evening. Townsends' are a moth specialist with over 90% of its diet composed of lepidopteran.

The primary threat to the species is almost certainly disturbance or destruction of roost sites (e.g., recreational caving, mine reclamation, renewed mining in historic districts). This species is very sensitive to disturbance events and has been documented to abandon roost sites after human

Common kingsnake: The common kingsnake is generally associated with lowland river valleys. In southeastern Colorado, it has been found near irrigated fields on the floodplain of the Arkansas River, in rural residential areas in plains grassland, near stream courses, and in other areas dominated by shortgrass prairie. Periods of inactivity are spent in burrows and logs, in or under old buildings, in other underground spaces, or beneath various types of cover.

Known from a few locations in southeastern Colorado (north to the vicinity of the Arkansas River) and a few sites in extreme southwestern Colorado (western Montezuma County), at elevations below about 5,200 feet, the species is generally difficult to find but may be locally fairly common in its very restricted range in Colorado.

Milk snake: The milk snake occupies a wide variety of habitats in Colorado, including shortgrass prairie, sandhills, shrubby hillsides, canyons and open stands of ponderosa pine with Gambel oak in the foothills, pinyon-juniper woodlands, arid river valleys, and abandoned mines. It generally stays hidden, except at night, and may be found under discarded railroad ties in sand-hill regions. Hibernation sites include rock crevices that may be shared with other snake species.

The species occurs throughout most of Colorado at elevations primarily below 8,000 feet and is generally scarce or at least hard to find, but locally fairly common.

Massasauga: Massasauga habitat in Colorado consists of dry plains grassland and sandhill areas. Massasauga may be attracted to sandy soils supporting abundant rodent populations. The species occurs in southeastern Colorado at elevations below about 5,500 feet.

Mountain Plover: Mountain plovers are found throughout the Royal Gorge Field Office (RGFO) in suitable habitats. While the species is relatively rare, they can be found generally in open, flat

tablelands that display some function of disturbance such as agricultural production, drought, grazing, fire, etc. (Knopf and Miller 1994). Plover habitat associated with this assessment is located in Baca, Cheyenne, Kiowa, Morgan, Weld, and Yuma counties.

American white pelican: Habitat includes rivers, lakes, reservoirs, estuaries, bays, and open marshes, sometimes inshore marine habitats. Pelicans rest/roost on islands and peninsulas. In Colorado, nests usually occur on islands or peninsulas (natural or dredge spoils) in freshwater reservoirs. Eggs are laid on the ground in a slight depression or on a mound of earth and debris 24-36 inches across, 15-20 inches high, usually on low, flat, or gently sloping terrain. Nest sites usually are in open areas but often near vegetation, driftwood, or large rocks. Many of the reservoirs and major riparian systems within the RGFO resource area serve as important foraging and nesting locations.

Brewer's Sparrow: The Brewer's sparrow breeds primarily in sagebrush shrublands, but will also nest in other shrublands such as mountain mahogany or rabbit-brush. While migrating, the species will occupy wooded, brushy and weedy riparian, agricultural, and urban areas. They are locally uncommon to common on the eastern plains and lower foothills of Colorado.

Burrowing Owl: The burrowing owl is closely associated with active prairie dog colonies throughout its range. Burrowing owls require a mammal burrow or natural cavity surrounded by sparse vegetation. Burrow availability is often limiting in areas lacking colonial burrowing rodents. Burrowing owls frequently use burrows of black-tailed prairie dogs. They nest less commonly in the burrows of Gunnison's prairie dogs, skunks, foxes, and coyotes.

Ferruginous hawks: The ferruginous hawk inhabits grasslands and semi-desert shrublands, and is rare in pinyon-juniper woodlands. Ferruginous hawks are typically winter resident on the eastern plains, but may nest in this area on occasion. Winter residents concentrate around prairie dog towns. Winter numbers and distribution fluctuate greatly according to the availability of prairie dogs. Migrants and winter residents may also occur in shrublands and agricultural areas.

Breeding ferruginous hawks nest in isolated trees, on rock outcrops, structures such as windmills and power poles, or on the ground.

Bald eagle: Colorado populations of bald eagles typically nest in large cottonwood trees along rivers and reservoirs. Eagle densities reach their peak during the winter months when migrants arrive from the north. The bald eagle is a common winter (December through February) visitor to RGFO. Bald eagle usage (winter roosting, nesting, etc.) occurs near several major riparian areas and reservoirs on the eastern plains.

Golden eagle: Colorado populations of golden eagles occupy a variety of habitat ranging from grasslands and shrublands to forested woodlands. Nesting occurs on cliffs or in trees, but birds will range widely over surrounding habitats.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The act of leasing parcels for oil and gas development would have no direct impact on wildlife resources. However, the authorization to lease parcels for oil and gas development will likely result in future development at some locations. The magnitude and location of direct and indirect effects cannot be predicted until the site-specific APD stage. At this time, the speculative nature of this process does not provide specifics of development; therefore, specific impacts to terrestrial wildlife from development remain unknown. Potential effects of development for some species are below.

Black-tailed Prairie Dog: Many areas within the range of black-tailed dogs have been classified as valuable for oil and gas development. Possible direct negative impacts associated with oil and gas development include clearing and crushing of vegetation, reduction in available habitat due to pad construction, road development and well operation, displacement and killing of animals, alteration of surface water drainage, and increased compaction of soils. Indirect effects include increased access into remote areas by shooters and OHV users. Gordon et al. (2003) found that shooting pressure was greatest at colonies with easy road access as compared to more remote colonies. Conversely, oil and gas development may create areas with reduced shrub cover, providing additional habitat for prairie dogs to colonize.

Swift Fox: Oil and natural gas exploration fragment existing grasslands and increases road traffic and access by humans. Impacts of this type of disturbance on swift foxes are unknown, but both positive and negative effects may be expected. On the positive side, prey abundance for swift foxes may increase in the vicinity of roads. However, loss of local habitat, increased mortality due to vehicle collisions, trapping and accidental shooting may also result (Carbyn et al. 1994).

Townsend's big eared bat: It is unlikely that the proposed lease parcels offer habitat suitable for hibernation or rearing of young Townsend's big-eared bat. Perhaps widely distributed singly or in small groups during the summer months, roosting bats may be subject to localized disturbance from development activity and relatively minor but long term impacts from reductions in the extent of mature woodland stands as sources of roost substrate.

Reptile species: Direct effects to the BLM sensitive reptile species could include injury or mortality as a result of construction, production, and maintenance activities. These effects would most likely occur during the active season for these species, which is generally April to October.

Indirect effects could include a greater susceptibility to predation if roads or pads are used to aid in temperature regulation. Overall, however, there is a low likelihood that these species would be substantially affected.

Mountain Plover: Mountain plovers nest on nearly level ground (often near roads). Adults and chicks often feed on or near roads, and roads may be used as travel corridors by mountain plovers. These factors make plovers susceptible to being killed by vehicles. Therefore, as oil and gas infrastructure is developed and used, the probability of plover mortality or nest destruction will likely increase. While known nesting locations are currently unknown, mitigation (plover nesting survey, timing limitations, etc.) to prevent take will be identified at the APD planning stage.

American white pelican: Impacts to American white pelican will be minimal. The reservoir in its current state offers no habitat for pelicans. However, if the reservoir were to fill to the high watermark, it is conceivable that pelicans will use the reservoir for nesting and foraging. A development activity buffer may be necessary to minimize disturbance to this species. Therefore, lease stipulation CO-17 has been applied to parcel 8373 to protect a buffered area near potential white pelican nesting and foraging areas.

Brewer's Sparrow: Leasing will have no impact on individual migratory bird individuals, populations or habitat. If leases are developed, surface disturbing activities, such as road building or pad and pipeline construction will destroy existing habitat. If surface disturbing activities occur during the nesting season, "take" of nests may occur. Noise and human activity generated during construction, drilling, and production phases will likely result in a larger impact footprint than the disturbance footprint alone.

Migratory birds, including Brewer's sparrow, may be burned or killed by exhaust vents, heater-treaters, flare stacks, etc., if perched at the opening while in operation. An increase in activity, i.e. road traffic, will likely result in an increase in vehicular collisions with migratory birds. Mitigation proposed in the migratory bird section will be adequate to protect Brewer's sparrow.

Burrowing Owl: The primary impact to the burrowing owl from developing leases on federal lands would be from the potential loss of habitat or the disruption of a nest site if development were to occur within an active prairie dog colony. However, standard lease stipulations would

allow the BLM the flexibility to move development up to 200-meters to mitigate direct impacts to BLM sensitive species.

Ferruginous Hawk: Ferruginous hawks will construct nests upon oil and gas related structures. However, these nests are less successful than nests built upon natural structures due to repeated human visitation. While the footprint of individual oil and gas wells is minimal relative to other energy developments, the total habitat lost to the network of wells and connecting roads can be considerable in areas undergoing full-field development. The potential for oil and gas related disturbance of nesting, foraging or roosting raptors arises not only from new well installation activities, including road and pad construction, drilling and equipment installation over the course of several weeks to months, but also from continual servicing and maintenance of wells over their production lifetime. Raptors are protected by a suite of stipulations (CO-03, CO-18, and CO-19) that require no surface occupancy within one-eighth of a mile of nests and a timing limitation to protect raptor nesting and fledging habitat.

Bald eagle: Bald eagle foraging and nesting is dispersed and opportunistic across the entire RGFO area, with most activity centered near major riparian and reservoir areas. Surface disturbing activities that have potential to disrupt important bald eagle seasonal use activities are subject to NSO and TL provisions (CO-04 and CO-23) established in the Royal Gorge RMP. These stipulations have been successful in protecting ongoing nest efforts and maintaining the long term utility of roost and nest sites in the resource area and will be applied on parcel 8373.

Golden Eagle: Golden eagles are a wide ranging species that is dispersed across the entire RGFO area. Surface disturbing activities that have potential to disrupt golden eagle nesting activity are subject to NSO and TL provisions (CO-03, CO-18) established in the applicable Resource Management Plans. These stipulations have been successful in protecting ongoing nest efforts and maintaining the long term utility of nest sites in the resource area.

Potential Future Mitigation:

A potential condition of approval that could be applied at the development phase would require operators to conduct a survey for federally listed and BLM sensitive species where potential habitat exists. If these species or key habitat features are located, BLM may implement timing limitations and/or spatial buffers to mitigate conflicts to the extent allowed in the RGFO Resource Management Plan, Northeast Resource Management Plan and Code of Federal Regulations (43 C.F.R. § 3101.1-2).

If development is to occur between April 10 through July 10, a survey for nesting mountain plover will be required where habitat exists. A no surface occupancy buffer of 300–feet will be placed around located nests.

Migratory birds and raptors, including golden eagles, ferruginous hawks, and burrowing owls, are protected by federal law. Therefore, it will be required that a raptor nest survey be conducted within a 0.5–mile radius (Colorado Parks and Wildlife recommended golden eagle buffer) of future project sites. Raptor nests located will be protected by species appropriate no surface occupancy buffers and timing limitations approved by existing resource management plans.

As a potential condition of approval, if a ferruginous hawk constructs a nest upon any oil and gas related platforms (e.g. tanks), the BLM will be notified, an alternative nesting structure will be constructed, and the nest moved to the alternate structure at the expense of the lessee.

Additionally, BLM may require an operator move an operation and delay activities to protect valuable wildlife resources, if supported by the site-specific NEPA analysis for the development activity.

3.4.2.3 Wetlands and Riparian Zones

Preferred Alternative:

Affected Environment:

The proposed parcels are in eastern Colorado in Weld and Las Animas County. A few parcels are bisected by unnamed or small intermittent drainages of some size and may have improvements to capture some seasonal precipitation. There is limited possibility to support permanent wetlands consistently in these areas. Generally, the parcels are upland with either agriculture on the parcel or nearby, or are grazed rangelands. Livestock watering facilities such as windmills and stock ponds are visible near to several parcels with drainages indicating that the stream courses going through the lease parcels are very likely ephemeral without dependable water to support wetland habitats. The two parcels closest to Grover Colorado, 8412 and 8409 likely have wetlands needing protective stipulation.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

In all cases, any parcel with a drainage suspected of carrying water with some regular frequency is treated as a stream with riparian and aquatic habitat present. Due to this, stipulations to guide safe placement of drilling areas are applied because seeps, springs, and small perennial habitats may be present even within otherwise ephemeral drainages. Should development occur, typical

field development impacts to wetlands generally would relate to overland flow acceleration impacts. These cannot be addressed at the leasing stage but are typical potential impacts that would be addressed at the site specific APD stage. All parcels with potential riparian or wetlands habitat have stipulations to protect these resources by direct avoidance of infrastructure.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Regional variation in land use modification occurs in the counties where leasing is proposed. On certain parcels post lease development would be intrusive where development would noticeably alter disturbance regimes in proximity to riparian areas and wetlands. In other locations, development would be masked by extensive agriculture or other surface uses within modified drainage-ways and possibly in proximity to other oil and gas development. Most of the specific parcels under this lease sale in Las Animas not in close proximity to other substantial oil and gas activity so new activity would be additive and cumulative to other area wide ranching, agriculture, and other existing land uses. Weld County parcels have more oil and gas activity in proximity.

Potential Future Mitigation:

At the APD stage, RGFO will need to evaluate if location stipulations alone are sufficient to protect wetland resources or if other protective measures are necessary. RGFO will incorporate appropriate oil and gas development BMPs to limit and buffer overland runoff from being accelerated into drainages.

3.4.2.4 Aquatic Wildlife

Preferred Alternative:

Affected Environment:

The proposed parcels are in eastern Colorado in Weld and Las Animas County. A few parcels are bisected by unnamed or small intermittent drainages of some size and may have improvements to capture some seasonal precipitation. There is limited possibility to support permanent aquatic habitat consistently in these areas. Generally, the parcels are upland with either agriculture on the parcel or nearby, or are grazed rangelands. Livestock watering facilities such as windmills and stock ponds are visible near to several parcels with drainages indicating that the stream courses going through the lease parcels are very likely ephemeral without dependable water to support wetland habitats for aquatic wildlife. The two parcels closest to

Grover Colorado, 8412 and 8409 likely have wetlands needing protective stipulation. Stipulations to keep production away from wetland habitats is beneficial to aquatic wildlife.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

In all cases, any parcel with a drainage suspected of carrying water with some regular frequency to support aquatic habitat is treated as a stream with riparian and aquatic habitat present. Due to this, stipulations to guide safe placement of drilling areas are applied because seeps, springs, and small perennial habitats may be present even within otherwise ephemeral drainages. Should development occur, typical field development impacts to wetlands generally would relate to overland flow acceleration impacts. These cannot be addressed at the leasing stage but are typical potential impacts that would be addressed at the site specific APD stage. All parcels with potential riparian or wetlands habitat have stipulations to protect these resources by direct avoidance of infrastructure .

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Regional variation in land use modification occurs in the counties where leasing is proposed. On certain parcels post lease development would be intrusive where development would noticeably alter disturbance regimes in proximity to riparian areas and wetlands. In other locations, development would be masked by extensive agriculture or other surface uses within modified drainage-ways and possibly in proximity to other oil and gas development. Most of the specific parcels under this lease sale in Las Animas not in close proximity to other substantial oil and gas activity so new activity would be additive and cumulative to other area wide ranching, agriculture, and other existing land uses. Weld County parcels have more oil and gas activity in proximity.

Potential Future Mitigation:

At the APD stage, RGFO will need to evaluate if location stipulations alone are sufficient to protect wetland resources or if other protective measures are necessary. RGFO will incorporate appropriate oil and gas development BMPs to limit and buffer overland runoff from being accelerated into drainages.

3.4.2.5 Terrestrial Wildlife

Affected Environment:

See the migratory bird section for a general habitat description of proposed lease parcels. The area encompassing the proposed lease parcels is vast, stretching the entirety of the high plains in

Colorado. The area encompasses deer seasonal ranges. Winter range is that part of the overall range of a species where 90 percent of the individuals are located during the average five winters out of ten from the first heavy snowfall to spring green-up, or during a site specific period of winter as defined for each data analysis unit. All or portions of the following parcels contain big game winter habitat (mule deer severe winter range/critical winter range, elk severe winter range/winter concentration areas, bighorn sheep winter range, and/or pronghorn winter concentration area): 8341, 8343, 8405, 8408, 8410, and 8411.

Bighorn sheep production areas are that part of the overall range of bighorn sheep occupied by the females from May 1 to July 15 for lambing. This information was derived from Colorado Parks and Wildlife biologists, district wildlife managers, and researchers. All or portions of the following parcels contain bighorn sheep production areas: 8341 and 8343.

Plains sharp-tailed grouse occur where grass is dominant with light interspersed shrubs or trees. During the breeding season, grouse congregate on specific areas (leks) during the early morning hours and occasionally evenings. Parcel 8410 is on the edge of a known lek and most of the remaining parcel is located within the lek production area.

Few raptor nest locations are known within the proposed lease parcels for two primary reasons, lack of information and the fact that many parcels are located on privately owned surface. Lease stipulations attached to each parcel would require raptor nest surveys that maintain site characteristics of existing nests. Additionally, timing limitations will reduce disruption of adult attendance at each known occupied nest location.

Several parcels are located in Colorado Natural Heritage Program (CNHP) Potential Conservation Areas (PCAs). A PCA may include a single occurrence of a rare element or a suite of rare elements or significant features. The goal is to identify a land area that can provide the habitat and ecological processes upon which a particular element or suite of elements depends for their continued existence. The best available knowledge of each species' life history is used in conjunction with information about topographic, geomorphic, and hydrologic features, vegetative cover, as well as current and potential land uses. The proposed boundary does not automatically exclude all activity. Specific activities or land use changes proposed within or adjacent to the preliminary conservation planning boundary should be carefully considered and evaluated for their consequences to the element on which the conservation unit is based.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The act of leasing the parcels for oil and gas development would have no direct impact on wildlife resources; however, impacts at the exploration and development stage could have impacts on wildlife. The magnitude and location of direct and indirect effects cannot be predicted until the site specific APD stage of development.

At this time, specifics of potential future development are unknown; therefore, specific impacts to terrestrial wildlife caused by potential future development cannot be analyzed with accuracy at this stage. If a parcel is leased and development occurs, impacts likely to occur will be habitat loss and fragmentation (well pad construction, road construction, etc.). Wildlife could avoid preferred habitat because of human presence, noise from drilling and production facilities, increased road density and traffic.

Sawyer et al. (2006) demonstrated an avoidance response by mule deer of well pads and roads in the development of a natural gas field in western Wyoming and Northrup et al. (2015) conducted research indicating similar results in mule deer avoidance in the Piceance Basin of Colorado. The response was immediate (i.e., year 1 of development) and no evidence of acclimation occurred during the course of the 3 year study. However, the indirect habitat loss caused by an avoidance response of mule deer could be reduced by 38-63% with the use of advanced technologies and proper planning that minimize the number of well pads and amount of human activity associated with them (Sawyer et al. 2006). Northrup et al. (2015) also suggested that measures aimed at mitigation impacts from drilling, such as seasonal drilling restrictions, sound and light barriers, and reductions in vehicle traffic, are likely to have greatest benefit to deer. Therefore, to protect terrestrial species during critical times of the year, parcels that contain big game winter habitat will have stipulation CO-09 (TL)) attached to protect the resource.

Parcels that are within bighorn sheep lambing habitat will have stipulation CO-12 (TL) attached.

Plains sharp-tailed grouse leks are the focal point for annual reproduction and movements of the remaining grouse and if these habitats are severely altered or lost, the grouse population within the oil field can experience a decrease in numbers (Williamson 2008). Stipulation CO-02 (NSO) will be attached to protect leks and the surrounding habitat.

Raptors are protected by a combination of “no surface occupancy” and “timing limitation” stipulations that are attached to leases to reduce adverse effects of potential oil and gas development. This control method allows the protection of known active nest sites during the APD phase. While the footprint of individual wells is minimal, the functional habitat lost to the

network of wells and connecting roads can be considerable. The potential for oil and gas related disturbances of nesting, foraging and roosting raptors arises not only from new well installation activities, including road and pad construction, drilling, and equipment installation over the course of several weeks to months, but also from continual servicing and maintenance of wells over their productive lifetime.

Several lease parcels are located within PCAs; however, the RGFO RMP and the Northeast RMP contain a suite of stipulations that will protect the elements outlined in each PCA in the event that leased parcels are eventually developed.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Throughout the lease area there are many activities currently occurring, along with historic impacts, which affect wildlife resources. These activities include: oil and gas development, residential development, grazing, agriculture, mining and recreation. While the leasing of parcels will not compound these impacts, future oil and gas development may impose deleterious effects. Every parcel is unique and cumulative impacts will need to be thoroughly addressed in the APD stage.

Potential Future Mitigation:

Because of the lack of raptor nesting information and the lease stipulations attached to each parcel, a standard COA would require a raptor nest survey where habitat existed. If a nest were found, the stipulations would require the lessee to maintain the integrity of site characteristics for existing nests. Additionally, timing limitations will reduce disruption of adult attendance at each known occupied nest location.

Additionally, BLM may require an operator to move an operation and delay activities to protect valuable wildlife resources, if supported by the site-specific NEPA analysis for the development activity.

3.4.3 Heritage Resources and Human Environment

3.4.3.1 Cultural Resources

Affected Environment:

Paleoindian sites are relatively scarce in the eastern half of Colorado, although a relatively large number are located in Weld County, where much oil and gas exploration continues to take

place. During the years 10,000-5500 BC, Paleoindian populations appear to have subsisted on large game (based on associated lithic tools), and probably supplemented their diets with a variety of small game and vegetal materials. Paleoindian materials from the Clovis period (9500-8950 BC) have been reported for southeastern Colorado, and although not extensive, Folsom and Plano artifacts seem to suggest an increase in population through time. It appears that Paleoindian populations were living in relatively small groups, and seem to have been mostly nomadic.

Many more cultural materials dating to the Archaic period (5500 BC-AD 500) have been found. The general size reduction of lithic tools, coupled with the presence of groundstone and vegetal evidence, suggests that a gradual shift in subsistence from large game to smaller game and possible horticulture was taking place. As early as 7800 BP, Archaic populations were living in pithouses, and, later, in structures with stone foundations. Based on these and other data, it appears that Archaic groups were sedentary to some extent.

Evidence of the Formative and Late Prehistoric/Protohistoric periods (AD 500-1600) occupations is spotty in the mountain region. While some scholars interpret data from these periods as representing a clearly defined "mountain formative culture", the majority still believe that the mountains were inhabited seasonally by Plains-oriented groups. However, there is little to indicate substantial Formative or Late Prehistoric/Protohistoric settlement in the mountains, most likely due to a nomadic lifestyle.

The appearance of pottery and stemmed, corner-notched projectile points in the archaeological record suggest a change in culture in the Colorado Plains around AD 100. The Late Prehistoric (AD 100-1725) was a time when aboriginal populations in eastern Colorado seemed to have adopted a more sedentary lifestyle than in previous times. The construction of complex structural sites, the adoption of pottery and the increased dependence on horticulture (in the southeastern Plains) are all suggestive of less mobility.

Sites dating to the protohistoric period (beginning with the Diversification Period, AD 1450-1725) are difficult to identify. In southeastern Colorado, sites of that time period are dated based on the presence of "Apachean" traits, like pottery, rock art, and stone circles. In northeastern Colorado, the Dismal River Aspect (AD 1525-1725) is distinguished by shallow pithouses, bell-shaped roasting pits, and by Dismal River Gray Ware ceramics.

The Protohistoric was a time of increasing population movement, and was further complicated by the arrival of the Spanish, and, later, the Euro-Americans. Starting in 1725, and continuing

until they were entirely eliminated by the 1870s, Native American groups identified as the Plains, Jicarilla, and Kiowa Apaches; the Utes; the Arapaho; the Comanches; the Cheyennes; and occasionally the Crow, Shoshoni, and the Blackfeet, were known to occupy the Plains region.

Europeans first explored southeastern Colorado in 1540. By 1822, Spanish dominance of the area ended. The Santa Fe Trail was established that year, bringing American populations into the region. Commercial ranching commenced in the 1860s, and the Homestead Act of 1862 increased the population further. By 1870, all Native American groups had been subdued, following several decades of violence. Buffalo hunting, popular among Euro-Americans in the early 1800s, finally decimated any remaining animals by 1880. After 1900, sugar beet production and dryland farming and ranching were the dominant industries in the area. The Great Depression and the Dust Bowl of the 1930s combined to cause severe problems for agriculturalists. By 1941, programs created by the Roosevelt administration and the industrial needs resulting from the U. S. entry into World War II had greatly improved the economy. Agriculture continues to predominate as the largest revenue-producing industry in eastern Colorado.

BLM conducted a literature review of records in the BLM-RGFO field office and database, and reviewed relevant information in the Compass database maintained by the Colorado Office of Archaeology and Historic Preservation. The records indicate that 332.8 acres (~6%) of the surface overlaying the proposed lease parcels have been inventoried for cultural resources. A total of 5 sites and isolated finds, of which 2 are eligible for the NRHP, have been recorded on or adjacent to proposed lease parcels.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

Because the leasing of parcels does not involve ground disturbance, it will have no effect on most historic properties. Future lease development that might affect all associated historic properties will be subject to the standard National NHPA Lease Stipulation (CSU CO-39). This lease stipulation requires additional cultural resources work pursuant to Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108, including identification, effects assessment, consultation, and if necessary, resolution of adverse effects. In an informational letter dated August 8, 2018, BLM notified SHPO that no historic properties would be affected by the proposed lease sale (see CR-RG-18-099 L).

Environmental Consequences of Leasing and Development - Cumulative Impacts:

None are known at present. However, any future development of parcels that are purchased as a result of the lease sale will be subject to additional cultural resources work pursuant to Section 106 of the National Historic Preservation Act, 54 U.S.C. § 306108, including identification, effects assessment, consultation, and if necessary, resolution of adverse effects. At that time, any adverse effect on historic properties will be identified and mitigated, if necessary.

Potential Future Mitigation:

None known at present.

3.4.3.2 Native American Religious Concerns

Affected Environment:

The mountains and plains in Colorado were inhabited by numerous tribes throughout history. Because of their nomadic culture, Plains populations used items that were easily transported and light, and therefore generally left little material evidence of habitation or traditional cultural properties. Although sacred locales are present on the lands within the RGFO jurisdiction, no known sites are present on any of the parcels included in the lease sale.

A consultation with potentially interested Native American tribes is ongoing [CR-RG-18-100 NA]. The BLM contacted the following tribes: Apache Tribe of Oklahoma, Cheyenne and Arapaho Tribes of Oklahoma, Cheyenne River Sioux Tribe, Comanche Tribe of Oklahoma, Crow Creek Sioux, Eastern Shoshone, Jicarilla Apache Nation, Kiowa Tribe of Oklahoma, Northern Arapaho Tribe, Northern Cheyenne Tribe, the Northern Ute Tribe, Oglala Sioux Tribe, Rosebud Sioux Tribe, Southern Ute Tribe, Standing Rock Lakota Tribe, and the Ute Mountain Ute Tribe.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The Northern Arapaho Tribe requested to have a tribal monitor present during ground disturbing activities at the APD stage. The Southern Ute Indian Tribe requested inventory reports and this information was provided to them. No other concerns were identified by the Tribes.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

None known at present.

Potential Future Mitigation:

None known at present.

3.4.3.3 Paleontological Resources

Affected Environment:

Occurrences of paleontological resources are closely tied to the geologic units that contain them. The probability for finding paleontological resources can be broadly predicted from the geologic units present at or near the surface. Using the Potential Fossil Yield Classification (PFYC) system, geologic units are classified base on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts, with a higher class number indicating higher potential (WO IM2008-009).

Many of the proposed lease sale parcels contain geologic formations that are classified as PFYC 3 formations that have an unknown or moderate to likely potential of containing significant paleontological resources that could potentially be impacted by activities associated with oil and gas leasing.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

Locations for proposed oil or gas well pads, pipelines, and associated infrastructure on these parcels will be subject to further analysis for the protection of paleontological resources during APD/development stage NEPA review.

Areas that contain geologic formations that are PFYC 4 or 5, for which new surface disturbance is proposed on or adjacent to bedrock (native sedimentary stone) including disturbance that may penetrate protective soil cover and disturb bedrock, may be subject to an inventory that shall be performed by a BLM permitted paleontologist and approved by the appropriate RGFO specialist. Surface disturbing activities in many areas including PFYC 4 and 5 may also require monitoring by a permitted paleontologist.

Direct impacts to or destruction of fossils would occur from unmitigated activities conducted on formations with high potential for important scientific fossil resources. Indirect impacts would involve damage or loss of fossil resources due to the unauthorized collection of scientifically

important fossils by workers or the public due to increased access to fossil localities on or near the lease parcels. Adverse impacts to important fossil resources would be long-term and significant since fossils removed or destroyed would be lost to science. Adverse significant impacts to paleontological resources can be reduced to a negligible level through mitigation of ground disturbing activities. It is possible that the leasing action would have the beneficial impact in that ground disturbance activities might result in the discovery of important fossil resources.

The following lands are likely to contain significant paleontological resources and are subject to Exhibit CO-29 to alert lessees of the (PFYC 4 and 5) paleontological area inventory requirement to protect paleontological values: none for this lease sale.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Cumulative impacts to paleontological resources could result from surface disturbing activities associated with potential development, when added to past, present, and reasonably foreseeable future actions, but would not be expected to contribute to cumulative impacts to paleontological resources in the lease area if protective mitigation measures are followed.

Potential Future Mitigation:

Mitigations will be developed during the NEPA review of individual ground disturbing activities. Typically, such mitigations include provisions for the monitoring of ground disturbance by a BLM permitted paleontologist, a requirement for the operator to inform all persons associated with the project of relevant Federal laws protecting fossil resources, and requirements regarding the disclosure to the RGFO of inadvertent fossil discoveries during construction or operation.

3.4.3.4 Social and Economic Conditions

Affected Environment:

The proposed parcels for the December 2018 lease sale are located in Las Animas County and Weld County, Colorado. Accordingly, the socioeconomic study area includes these two counties and the State of Colorado as the effects of the economic activity generated by the lease sale may impact the social and economic conditions within the counties and state. In 2016 the population of Las Animas County was 14,103 residents and the population of Weld County was 294,932 residents (U.S. Census Bureau 2017a). While Las Animas County has lost population since 2010, Weld County has continued to experience population growth (U.S. Census Bureau 2017b).

Agriculture is a traditional use of lands in the two counties and continues to be important today. In 2012 there as 602 farms in Las Animas County and 3,525 farms in Weld County (NASS 2014).

Much of the population growth in Weld County is associated with the increased oil and gas production that has occurred there. This growth has resulted in a more diverse and increasingly urban population compared to the county's rural roots. However, the influx of new residents and oil and gas development has put considerable stress on Weld County's transportation infrastructure. Most of Weld County's roads were originally designed as single lane farm roads and now struggle to meet the demands of the present day. These factors, among others, have driven a change in the lifestyle of a typical Weld County resident from rural to more urban living.

As discussed in the Eastern Colorado RMP (ECRMP) Socioeconomic Baseline Report (BLM 2017), the oil and gas industry is a major component of Colorado's economy and a 2015 study indicated that the industry recorded \$15.8 billion in production value, accounting for 38,650 direct jobs with average annual wages in excess of \$105,000—twice the average wage of all industries in Colorado. Collectively, this industry contributed nearly \$4.1 billion in employee income to Colorado households in 2014 (Wobbekind and Lewandoski 2015). A very large portion of the industry's economic impact on Colorado is attributable to oil and gas activity in Weld County—for example, in 2014 Weld County accounted for over 80 percent of Colorado's oil production and 15 percent of Colorado's gas production (Wobbekind and Lewandoski 2015).

Leasing mineral rights for the development of federal minerals generates public revenue through the bonus bids paid at lease auctions and annual rents collected on leased parcels not held by production. Nominated parcels approved for leasing are offered by the BLM at a minimum rate of \$2.00 per acre at the lease sale. These sales are competitive and parcels with high potential for oil and gas production often command bonus bids in excess of the minimum bid. In addition to bonus bids, lessees are required to pay rent annually until production begins on the leased parcel, or until the lease expires. These rent payments are equal to \$1.50 an acre for the first five years and \$2.00 an acre for the second five years of the lease.

The State of Colorado receives 49% of the total revenue associated with federal mineral leases. Federal mineral lease revenue for the State of Colorado is divided as such: 48.3 percent of all mineral lease rent and royalty receipts are sent to the State Education Fund (to fund K-12 education). Ten percent of all mineral lease rent and royalty receipts are sent to the Colorado Water Conservation Board. Approximately two percent of all mineral lease rent and royalty receipts are distributed directly to local school districts originating the revenue or providing

residence to energy employees and their children. Forty percent of all mineral lease rent and royalty receipts are sent to the Colorado Department of Local Affairs, which then distributes half of the total amount received to a grant program, designed to provide assistance with offsetting community impacts due to mining, and the remaining half directly to the counties and municipalities originating the Federal mineral lease revenue or providing residence to energy employees.

Bonus payments are allocated separately from rents and royalties in the following manner: 50 percent of all mineral lease bonus payments are allocated to two separate higher education trust funds: the “Revenues Fund” and the “Maintenance and Reserve Fund.” The Revenues Fund receives the first \$50 million of bonus payments to pay debt service on outstanding higher education certificates of participation. The Maintenance and Reserve Fund receives 50 percent of any bonus payment allocations greater than \$50 million. These funds are designated for controlled maintenance on higher education facilities and other purposes. The remaining 50 percent of state mineral lease bonus payments are allocated to the Local Government Permanent Fund, which is designed to accumulate excess funds in trust for distribution in years during which Federal mineral lease revenues decline by ten percent or more from the preceding year.

During the lease period, annual lease rents continue until one or more wells are drilled that result in production and associated royalties. The federal oil and gas royalties on production from public domain minerals equal 12.5 percent of the value of production (43 CFR 3103.3.1).

Past research on social impacts associated with energy development shows that social well-being often decreased during a boom, but then tended to increase once the boom is over. A comparative and longitudinal study conducted in Delta, Vernal, and Tremonton, Utah, and Evanston, Wyoming, addressed issues of social well-being in boomtowns (Brown et al. 2005; Brown et al. 1989; Greider et al. 1991; Hunter et al. 2002; Smith et al. 2001). With the exception of Tremonton, each of these communities experienced a boom during the late 1970s and early 1980s. Delta’s boom resulted after the construction of a power plant while the booms in Evanston and Vernal were primarily related to oil and gas development. At least four surveys were conducted in these communities from 1975 to 1995. Several indicators of social well-being were examined, including perceived social integration, relationships with neighbors, trust of community residents and community satisfaction. Delta and Evanston showed similar patterns associated with these indicators. During the peak boom years, residents experienced diminished perceived social integration, relationships with neighbors, trust of residents, and community satisfaction. Interestingly, Brown and others (2005) pointed out that the greatest declines in community satisfaction in Delta occurred just before the largest population increase of the 20

year study period, indicating that changes in population cannot alone account for shifts in community satisfaction and social integration. Nonetheless, by 1995, the levels of these indicators had returned to or exceeded pre-boom levels.

Another 2011 study highlights several of the changes that have been seen across the Bakken oil counties and the impacts to quality of life (Bohnenkamp et. al. 2011). For example, the study highlights that the familiarity of residents with other residents and the safety often felt in small rural communities has shifted to in-migration of new people and safety concerns resulting from not knowing these people. The study also highlights concerns over housing prices and values increasing and the 38 changing of the population. While there is an in-migration of people for oil field jobs, there has also been an out-migration of long-time residents due to not being able to afford the rising housing costs (Bohnenkamp et. al. 2011).

The proximity of oil and gas wells and related facilities can influence nearby residential property sales, especially those on split estate land. Landowners who do not own mineral rights may be subject to federal mineral development on their land. Usually, these landowners enter into a surface use agreement and receive compensation, i.e. income, for the use of their land. Estimates of how individual properties are affected by nearby oil and gas development vary from case to case depending on specific location and the exact character and features of a property.

Several studies published in the past several years have attempted to estimate how property values are impacted by nearby oil or gas exploration, drilling, and production. See Krupnick and Echarte (2017) for a summary of recent studies. In general, these studies find that, at the time of sale, the presence of oil and gas wells near the property reduces the property value relative to what it would have sold for without a nearby well. Unfortunately, the explicit and implicit assumptions used in these estimates (such as the maximum distance for a ‘nearby well’) vary a great deal from study to study, as does the size of the price impacts, which range from zero to negative 37%.

Who owns the minerals appears to be another factor in property values. Split estates are referenced as a possible source of property value differences in several studies and in one (Boslett et. al. 2016) property value estimates tended to be significantly lower in a Colorado region where the minerals were owned by the federal government compared to other areas where a comparable property was located above a non-federal mineral estate.

Additionally, multiple past studies identify concerns about possible environmental impacts associated with oil and gas exploration and development as one reason for property value differences. But these concerns (and their influence on prices) can be tempered. Roddewig and

others (2014) states that “(p)ast real estate market studies indicate that investigation and remediation can limit price and value impacts from oil and gas contamination.” Note that the BLM actively investigates and seeks remediation for oil and gas contamination resulting from production on federal land or into federal mineral reserves.

Current research also doesn’t provide much guidance on how long these price impacts persist. Bennett and Loomis in a study in Weld County, Colorado estimate a 1% decrease in urban house prices for every well being drilled within one-half mile “during the time the buyer is deciding upon buying the house”, but “(o)nce the well moves out of active drilling and into becoming a producing well, all our models show there is no statistically significant negative effect on house prices.”

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The direct effect of leasing and development would be the payments received from leasing all or a subset of the 5,217,410 acres of federal mineral estate. Indirect effects that might result, should exploration or development of the leases occur, could include increased employment opportunities related to the oil and gas and service support industry in the region as well as the economic contributions to Federal, State, and County governments related to lease payments, royalty payments, severance taxes, and property taxes. Other effects could include the potential for an increase in transportation, roads, and noise disturbance associated with development, and potential for change in property values due to development. These effects would apply to all public land users in the study area, and surface owners above and adjacent to the proposed lease parcels.

The BLM recognizes that economic activity associated with tourism and recreation can be an important contribution to local communities and their economies. For example, the ECRMP Socioeconomic Baseline Report (BLM 2017) indicated that in 2015, direct spending in Colorado generated by travel and tourism totaled over \$19.1 billion which supported over 160,000 jobs and produced earnings of over \$5.5 billion in the state (Dean Runyan Associates 2016). Potential impacts due to oil and gas development can be concerns for communities that promote recreation and tourism. Oil and gas exploration, drilling, or production, would potentially inconvenience visitors through increased traffic and traffic delays, noise, and visual impacts. The level of inconvenience would depend on the activity affected, traffic patterns within the area, noise levels, the length of time and season in which these activities occurred, and other factors. Increased truck traffic hauling heavy equipment, fracking fluids, and water as well as increased traffic associated with oil workers and increased populations could cause more traffic

congestion, increase commuting times, and affect public safety. Additionally, impacts to visitors could include reduction of current viewsheds, dark night skies, and soundscapes.

However, it is unknown when, where, how, or if future surface disturbing activities associated with oil and gas exploration and development such as well sites, roads, facilities, and associated infrastructure would be proposed. It is also not known how many wells, if any, would be drilled and/or completed, the types of technologies and equipment would be used and the types of infrastructure needed for production of oil and gas. Potential effects to tourism and the associated economic activity would be less likely to occur with the two parcels in Las Animas County that are in the very low category for exploration, development, and production potential (see Section 3.2.3). Given the very low potential for exploration, development and production in these parcels, there is greater uncertainty in whether any development will actually occur in these parcels and whether this development would affect local tourism. While there is a lower likelihood for development and fewer number of wells per township (<1 well) for these parcels, there is the potential for some possible impacts to tourism in local communities from future oil and gas development if and when it may occur in these two parcels.

The nine parcels in Weld County that are in the moderately high and high potential categories could have a greater effect on local tourism given the higher likelihood of development and higher number of potential wells per township (10-50 wells between the two categories). However, given that there is considerable oil and gas development already occurring in Weld County it is difficult to know what degree additional development would have on local tourism although additional truck traffic and congestion, noise, and change in viewsheds would likely affect visitors.

Due to energy market volatility and the dynamics of the oil and gas industry it is not feasible to predict the exact effects of this leasing action, as there are no guarantees that the leases will receive bids, and that any leased parcels will be explored or that exploration will result in discovery of viable fluid mineral production. This may be especially true for parcels in categories of very low for potential well development as discussed in the RFD (see Section 3.2.3). As such, the types, magnitude and duration of potential impacts cannot be precisely quantified at this time, and would vary according to many factors. Therefore, any parcel where future drilling activity would take place would first require an Application for Permit to Drill and requisite NEPA analysis, in which site specific issues would be examined including any identified socioeconomic issues resulting from disturbance and drilling on the leased parcel.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Any possible future development of fluid mineral resources resulting from this lease sale would be in addition to the current level of development.

Potential Future Mitigation:

None

3.4.3.5 Environmental Justice

Affected Environment:

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, states “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations...” The purpose of EO 12898 is to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes that may experience common conditions of environmental exposure or effects associated with a plan or project. A review of U.S. Census Bureau 2016 population estimates for race and Hispanic origin (U.S. Census Bureau 2017a), indicates that Las Animas and Weld counties meet the criteria of having minority populations that are five percentage points greater than the State of Colorado. Based upon U.S. Census Bureau Small Area Income and Poverty 2016 estimates, the percent of population (all ages) in poverty in Las Animas County was five percentage points higher than for the State of Colorado (U.S. Census Bureau 2017c). This indicates that both Las Animas and Weld counties have populations that can be considered as environmental justice populations.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

No surface-disturbing activities are associated with a lease sale and; therefore, impacts from the lease sale would not disproportionately adversely affect environmental justice populations. As previously noted, any parcel where future drilling activity would take place would first require additional NEPA analysis in which site specific impacts including environmental justice issues will be examined. Please also refer to sections 3.3.3.1 Cultural Resources and 3.3.3.2 Native American Religious Concerns for the discussion of potential impacts associated with leasing and development. The BLM has considered all input from persons or groups regardless of age, income status, race, or other social or economic characteristics. The outreach and public involvement activities taken by the RGFO for this effort, including the consultation of tribes, are

described in sections 1.4 Public Participation, 4.1 Persons/Agencies Consulted, 4.2 Native American Tribes Consulted, and 4.3 Surface Owner Coordination.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Any possible future development of fluid mineral resources resulting from this lease sale would be in addition to the current level of development.

Potential Future Mitigation:

None

3.4.3.6 Visual Resources

Affected Environment:

BLM and USFS manage landscapes and scenic values for varying levels of protection and modification, giving consideration to other resource values and uses and the scenic quality of the landscape. Visual resources (the landscape) consist of landform (topography and soils), vegetation, bodies of water (lakes, streams, and rivers), and human-made structures (roads, buildings, and modifications of the land, vegetation, and water). These elements of the landscape can be described in terms of their form, line, color, and texture or pattern. Normally, the wider variety of these elements in a landscape, the more interesting or scenic the landscape becomes, if the elements exist in harmony with each other. Because most of the Project Area is located on private surface ownership, BLM Visual Resource Management (VRM) classifications do not apply to the Project Area with the exception of parcel 8373, located on BLM surface ownership. Visual Resource Inventory (VRI) data has been used in this analysis to determine visual changes that would result from implementation of the alternatives. The VRI process provides the BLM with a means to determine visual values based on scenic quality, viewer sensitivity, and a delineation of distance zones. A visual resource inventory (VRI) was conducted for the RGFO in 2015.

Weld County

In the Weld County area, the inventory found that the landscape is fairly uniform and already has several modifications to the landscape such as pre-existing oil and gas development, wind turbines, residential development, and agricultural modifications. There are also very few major travel corridors. Where the parcels differ is in viewer sensitivity. The VRI indicates that people are sensitive to changes within and near the USFS Comanche National Grasslands (CNG). Parcels 8405-8412 and 8447 are in close proximity to CNG. Parcel 8373 is adjacent to Riverside

reservoir in an area of rural residences and working ranches. While several modifications have already occurred within this landscape, there is a sentiment that oil and gas development is cumulatively changing the overall character and the scenic values. All of the Weld County Parcels except 8410, 8411, 8412 and 8347 are within five miles of the Pawnee Pioneer Trails Scenic Byway and carry a high value for scenic quality for its importance to local heritage and cultural tourism.

The overall project area is within a highly modified environment with existing structures and with less viewer sensitivity to landscape modifications. Although the BLM establishes VRM Classes regardless of surface ownership, VRM Class objectives and management only apply to BLM-administered land. The proposed Weld County parcels are in areas with a VRM Class III or IV rating. These provide for partial to major modifications to the existing character of the landscape. Only one parcel, 8409 is located in an area with a Class II rating where the objective is to retain the existing character of the landscape. Only parcel 8373 rated Class III in the VRI lies on BLM surface where class objectives do apply.

Las Animas County

The proposed lease sale includes parcels 8341 and 8343 in Las Animas County. These parcels lie within fingered drainages with flat to rolling valley bottoms and plateaus with moderate side slopes. Contrast in colors vary greatly in vegetation and form with cultural modification present but not dominant. Rural residents value landscape integrity to a high degree. Within the canyon area, inventory classes met the definition for class II while adjacent grasslands were rated Class IV. The objectives for a Class II area is to retain the existing character of the landscape whereas a Class IV provides for management activities that require major modification of the existing character of the landscape. Parcels 8341 and 8343 are located on private surface where the VRM class objectives do not apply.

Characteristic Landscape

The Project Area is generally located in a remote area where the landscape has evolved from open prairies into a more rural pastoral setting with increasing oil and gas development. The landscape in the Project Area has been moderately altered by the existing road network to support ranches and existing oil and gas operations. These elements contribute to visual degradation of the valued landscape character and sense of place. The lack of vegetation and the presence of imported aggregate on the surface introduce colors, lines, forms and textures that are in contrast with the surrounding areas and the PNG.

The lines, forms, and colors in the Project Area are mostly consistent with the natural scenery of the landscape but are contrasted with existing oil and gas development. Other existing activity affecting the characteristic landscape in the Project Area unimproved roads associated with livestock grazing and range management.

Viewpoints of the Project Area

Due to the remote location of and limited access to the Project Area, the primary locations with views of the Project Area include travel routes and two residential homes. Several county roads traverse or skirt the Project Area. The Las Animas parcels are 10 miles from the closest county road while most of the Weld County parcels are 2-5 miles from the scenic byway.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

For the areas proposed for leasing, the proposed action of identifying parcels for the sale would not change the existing landscape. Lease sales do not authorize wells to be drilled prior to issuance of an APD, which requires project specific application to the BLM and analysis. If a lease were to go into production in areas that already has high levels of human modification, the proposed action would introduce visual contrasts but at limited levels given the context of the project area, the level of existing development, and the use of best management practices (BMPs). If leases were developed, structures associated with this activity could be introduced on the landscape such as roads, pads, buildings, and pump infrastructure potentially creating contrasts in form, texture, color, and line at varying levels. The activity would introduce noise from vehicles and equipment during construction and would continue to a lesser degree when construction is completed.

Night skies can be impacted due to artificial lighting. During construction and the drilling phase of a site, artificial lighting would be at its highest level. These lighting impacts are generally short term and temporary. Typically, well locations do not have permanent lighting, however there would be changes to the current conditions and the addition of BMP's would need to be evaluated at the APD stage to minimize the contrast.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Weld County

Any subsequent development associated with the lease would add additional contrasts to the environment. In areas where viewers are more sensitive to change, such as near the CNG and Pawnee Scenic Byway, the changes associated with oil and gas development would be seen as an

incremental impact to visual resources and the overall character of the area. This project would add to this overall cumulative impact to visual resources in these areas.

Las Animas County

Any subsequent development associated with the lease would add additional contrasts to the environment. In the Las Animas County area where viewers are more sensitive to change, the changes associated with oil and gas development would be seen as an incremental impact to visual resources and the overall character of the area. This project would add to this overall cumulative impact to visual resources in these areas.

Potential Future Mitigation:

All Counties: The BMPs could include painting equipment a proper color that blends with the environment and locating facilities so they are off ridges, are screened from nearby residences, and would decrease visual contrasts with the natural landscape. BMPs for lighting could be recommended where development introduces lighting contrasts in areas where dark skies are a concern. In split estate areas where there is less development, these contrasts would most likely be more readily noticeable due to the lack of other structures or human modifications in the area. BMPs would be recommended to reduce these impacts.

3.4.3.7 Wastes, Hazardous or Solid

Affected Environment:

It is assumed that conditions associated with the proposed project site, both surface and subsurface, are currently clean and that there is no known contamination. A determination will be made by the operator prior to initiating the project, if there is evidence that demonstrates otherwise (such as solid or hazardous substances have been previously used, stored, or disposed of at the project site).

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The act of leasing the parcels for oil and gas development will not involve the use and management of petroleum products or hazardous substances. However, these activities will take place at the exploration and development stage. The magnitude and location of potential direct and indirect effects cannot be understood or analyzed until the site-specific APD stage of development.

Environmental Consequences of Leasing and Development - Cumulative Impacts:

This action may lead to future operations that would use some type of chemical or petroleum product. However, if mitigation measures are implemented for this action, then future impacts would be limited.

Potential Future Mitigation:

The following mitigations are applied as COAs and assist in reducing potential spills resulting in groundwater and/or soil contamination:

- All above ground storage tanks will need to have secondary containment constructed in accordance with standard industry practices or an associated Spill Prevention Control and Countermeasures plan in accordance with State regulations (if applicable).
- If drums are used, secondary containment constructed in accordance with standard industry practices or governing regulations is required. Storage and labeling of drums should be in accordance with recommendations on associated MSDS sheets, to account for chemical characteristics and compatibility.
- Appropriate level of spill kits need to be onsite and in vehicles.
- All spill reporting needs to follow the reporting requirements outlined in NTL-3A.
- No treatment or disposal of hazardous wastes (non-E&P) on site is allowed on federal lands.
- All concrete washout water needs to be contained and properly disposed of at a permitted offsite disposal facility.
- If pits are utilized, they need to be lined to mitigate leaching of liquids to the subsurface, as necessary. State and/or Federal regulations will apply to pit construction and removal.

3.4.3.8 Scenic Byways

Affected Environment:

Weld County parcels 8405-8409 and 8447 are the closest to the Colorado - designated Pawnee Pioneer Trails Scenic Byway (approximately 2-5 miles from the byway). The 2013 Visual Resource Inventory (VRI) conducted by the BLM identified this area as high in visual resource values associated with scenic quality due to the proximity to the scenic byway where wildlife

viewing is dependent upon intact landscapes. Weld County has a high number of oil and gas wells in the vicinity.

Environmental Consequences of Leasing and Development - Direct and Indirect Impacts:

The proposed action of a lease sale does not affect the view shed from the scenic byway however if development is proposed, structures associated with oil and gas would introduce a change to the landscape. The Weld County parcels may be visible from the Byway. Visual resource impacts would need to be evaluated further if development is to occur (see the Visual Resource section, 3.3.3.6).

Environmental Consequences of Leasing and Development - Cumulative Impacts:

Development associated with the lease sale could have cumulative impacts to visual resources along the Byways. See the Visual Resource section, 3.3.3.6.

Potential Future Mitigation:

Apply best management practices to reduce impacts to visual resources associated with the scenic byway.

Chapter 4 - Coordination and Consultation

4.1 Persons/Agencies Consulted

- Colorado Parks and Wildlife
- Las Animas County
- Weld County

4.2 Native American Tribes Consulted

A consultation with the following Native American tribes is ongoing:

- Apache Tribe of Oklahoma
- Cheyenne and Arapaho Tribes of Oklahoma
- Cheyenne River Sioux Tribe
- Comanche Tribe of Oklahoma
- Crow Creek Sioux
- Eastern Shoshone
- Jicarilla Apache Nation
- Kiowa Tribe of Oklahoma
- Northern Arapaho Tribe
- Northern Cheyenne Tribe
- Ute Indian Tribe of the Uintah and Ouray Reservation
- Oglala Sioux Tribe
- Rosebud Sioux Tribe
- Southern Ute Indian Tribe
- Standing Rock Lakota Tribe
- Ute Mountain Ute Tribe

4.3 Surface-owner Coordination

A letter was sent to surface owners of split estate proposed lease parcels.

4.4 Interdisciplinary Review

Name	Title	Resource
Forrest Cook	Air Quality Scientist	Air Quality
Sharon A. Sales	Natural Resource Specialist	Project Lead, Fluid Minerals
Aaron Richter	Natural Resource Specialist	Hydrology/Water Quality, Soils and Prime and Unique Farmlands, Invasive Species Management, Upland Vegetation and Range.
Jessica M. Montag	Regional Socioeconomic Specialist	Socioeconomics, Environmental Justice
Melissa Smeins	Geologist/Petroleum Engineer	Solid Minerals, Paleontology, Hazardous Waste
Matt Rustand	Wildlife Biologist	Migratory Birds, Special Status Species, Terrestrial Wildlife
David Gilbert	Fishery Biologist	Aquatic Wildlife, Wetlands and Riparian
Monica Weimer	Archeologist	Cultural Resources, Native American Religious Concerns
Linda Skinner	Recreation Planner	Visual Resources, Areas of Critical Environmental Concern, Lands with Wilderness Characteristics, Wilderness Study Areas, Wild and Scenic Rivers

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Attachment A - All Proposed Parcels/Proposed Action with Stipulations for Lease

RGFO December 13, 2018, Sale Parcels

12 parcels totaling 5,217.41 acres

PARCEL ID: 8341

T.0300S., R.0550W., 6TH PM

Section 1: S2NW,SW;

Section 2: Lot 1-4;

Section 2: S2N2,S2;

Section 11: N2,SW,SWSE;

Section 12: S2NE,NW,E2SW,SE;

Las Animas County

Colorado 1883.840 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8343

T.0290S., R.0550W., 6TH PM

Section 25: NE,E2NW,N2SE,SESE;

Section 26: ALL;

Section 35: W2W2;

Las Animas County

Colorado 1160.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8347

T.0090N., R.0600W., 6TH PM

Section 21: W2;

U.S. Interest 50.00%

Weld County

Colorado 320.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8373

T.0040N., R.0610W., 6TH PM

Section 5: SWSE EXCL C0123882;

Section 7: LOT 3 EXCL C0123882;

Weld County

Colorado 1.490 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

BLM; CORM: RGFO

PARCEL ID: 8405

T.0080N., R.0580W., 6TH PM

Section 17: S2SW;

U.S. Interest 67.11%

Weld County

Colorado 80.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8406

T.0080N., R.0580W., 6TH PM

Section 20: SW;

U.S. Interest 4.17%

Weld County

Colorado 160.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8407

T.0090N., R.0600W., 6TH PM

Section 2: N2SE;

Weld County

Colorado 80.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8408

T.0100N., R.0590W., 6TH PM

Section 4: Lot 15-18;

Section 6: Lot 8-11;

Section 10: S2SE;

Section 23: S2NE;

Weld County

Colorado 456.440 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8409

T.0100N., R.0610W., 6TH PM

Section 29: SWNE,N2SE;

Weld County

Colorado 120.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8410

T.0110N., R.0590W., 6TH PM

Section 2: Lot 2-4; U.S. Interest 100.00%

Section 2: S2N2; U.S. Interest 100.00%

Section 2: LOT 1 EXCL 6.351 AC; U.S. Interest 100.00%

Weld County

Colorado 315.640 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8411

T.0110N., R.0600W., 6TH PM

Section 34: N2; U.S. Interest 100.00%

Weld County

Colorado 320.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8412

T.0110N., R.0610W., 6TH PM

Section 13: N2;

U.S. Interest 50.00%

Weld County

Colorado 320.000 Acres

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

Attachment B - Recommended Parcel Deferrals

No parcels have been recommended for Deferral for the December Sale

Attachment C - Preferred Alternative Parcels with Stipulations for Lease

RGFO December 13, 2018 Sale Parcels

12 parcels totaling 5,217.41 acres

PARCEL ID: 8341

T.0300S., R.0550W., 6TH PM

Section 1: S2NW,SW;

Section 2: Lot 1-4;

Section 2: S2N2,S2;

Section 11: N2,SW,SWSE;

Section 12: S2NE,NW,E2SW,SE;

Las Animas County

Colorado 1883.840 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-09 to protect big game winter habitat

All lands are subject to Exhibit CO-12 to protect bighorn sheep lambing habitat

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8343

T.0290S., R.0550W., 6TH PM

Section 25: NE,E2NW,N2SE,SESE;

Section 26: ALL;

Section 35: W2W2;

Las Animas County

Colorado 1160.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-09 to protect big game winter habitat

All lands are subject to Exhibit CO-12 to protect bighorn sheep lambing habitat

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8347

T.0090N., R.0600W., 6TH PM

Section 21: W2;

U.S. Interest 50.00%

Weld County

Colorado 320.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8373

T.0040N., R.0610W., 6TH PM

Section 5: SWSE EXCL C0123882;

Section 7: LOT 3 EXCL C0123882;

Weld County

Colorado 1.490 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-04 to protect bald eagle roosts or nests

All lands are subject to Exhibit CO-07 to protect waterfowl and shorebird habitat and rookeries

All lands are subject to Exhibit CO-17 to protect white pelican nesting and feeding habitat

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-23 to protect bald eagle winter roost sites

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

All lands are subject to Exhibit NE-02 to protect riparian and wildlife values near reservoirs

BLM; CORM: RGFO

PARCEL ID: 8405

T.0080N., R.0580W., 6TH PM

Section 17: S2SW;

U.S. Interest 67.11%

Weld County

Colorado 80.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-09 to protect big game winter habitat

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis
PVT/BLM; CORM: RGFO

PARCEL ID: 8406

T.0080N., R.0580W., 6TH PM

Section 20: SW;

U.S. Interest 4.17%

Weld County

Colorado 160.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis
PVT/BLM; CORM: RGFO

PARCEL ID: 8407

T.0090N., R.0600W., 6TH PM

Section 2: N2SE;

Weld County

Colorado 80.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-28 to protect perennial water impoundments and streams, and/or riparian/wetland vegetation zones, relocation beyond riparian vegetation zone required

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8408

T.0100N., R.0590W., 6TH PM

Section 4: Lot 15-18;

Section 6: Lot 8-11;

Section 10: S2SE;

Section 23: S2NE;

Weld County

Colorado 456.440 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-09 to protect big game winter habitat

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-28 to protect perennial water impoundments and streams, and/or riparian/wetland vegetation zones, relocation beyond riparian vegetation zone required

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8409

T.0100N., R.0610W., 6TH PM

Section 29: SWNE,N2SE;

Weld County

Colorado 120.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-28 to protect perennial water impoundments and streams, and/or riparian/wetland vegetation zones, relocation beyond riparian vegetation zone required

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8410

T.0110N., R.0590W., 6TH PM

Section 2: Lot 2-4; U.S. Interest 100.00%

Section 2: S2N2; U.S. Interest 100.00%

Section 2: LOT 1 EXCL 6.351 AC; U.S. Interest 100.00%

Weld County

Colorado 315.640 Acres

All lands are subject to Exhibit CO-02 to protect grouse dancing grounds

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-09 to protect big game winter habitat

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8411

T.0110N., R.0600W., 6TH PM

Section 34: N2; U.S. Interest 100.00%

Weld County

Colorado 320.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-09 to protect big game winter habitat

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

PARCEL ID: 8412

T.0110N., R.0610W., 6TH PM

Section 13: N2;

U.S. Interest 50.00%

Weld County

Colorado 320.000 Acres

All lands are subject to Exhibit CO-03 to protect raptor nests

All lands are subject to Exhibit CO-18 to protect raptor nesting and fledgling habitat

All lands are subject to Exhibit CO-19 to protect ferruginous hawk nesting and fledgling habitat

All lands are subject to Exhibit CO-28 to protect perennial water impoundments and streams, and/or riparian/wetland vegetation zones, relocation beyond riparian vegetation zone required

All lands are subject to Exhibit CO-34 to alert lessee of potential habitat for a threatened, endangered, candidate, or other special status plant or animal

All lands are subject to Exhibit CO-39 to protect cultural resources

All lands are subject to Exhibit CO-56 to alert lessee of potential supplementary air analysis

PVT/BLM; CORM: RGFO

Attachment D - Stipulation Exhibits

EXHIBIT CO-02/GGNCA-1

Lease Number: <LEASE_NUMBER>

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal description or other description):

<LEGAL_DESCRIPTIONS>

For the purpose of:

To protect grouse dancing grounds (including sage and mountain sharp-tailed grouse and lesser and greater prairie chickens) within a one-quarter mile radius from the site.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

An exception may be granted depending on current usage of the site or on the geographical relationship to topographic barriers and vegetation screening.

EXHIBIT CO-03

Lease Number: <LEASE_NUMBER>

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal description or other description):

<LEGAL_DESCRIPTIONS>

For the purpose of:

To protect raptor nests within a one-eighth mile radius from the site.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

An exception may be granted depending on current usage, or on the geographical relationship to topographic barriers and vegetation screening.

EXHIBIT CO-04

Lease Number: <LEASE_NUMBER>

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal description or other description):

<LEGAL_DESCRIPTIONS>

For the purpose of:

To protect bald eagle roosts and nests within a one-quarter mile radius from the site.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

An exception may be granted to this stipulation depending on the current usage of the site, or the geographical relationship to the topographic barriers and vegetation screening.

EXHIBIT CO-07

Lease Number: <LEASE_NUMBER>

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal description or other description

<LEGAL_DESCRIPTIONS>

For the purpose of:

To protect waterfowl and shorebird habitat and rookeries within significant production areas.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT CO-09

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

December 1 through April 30

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect big game (mule deer, elk, pronghorn antelope, and bighorn sheep) winter range, including crucial winter habitat and other definable winter range as mapped by the Colorado Division of Wildlife. This may apply to sundry notice that require an environmental analysis.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

An exception may be granted under mild winter conditions for the last 60 days of the closure.

EXHIBIT CO-12

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

May 1 through July 15

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect Rocky Mountain bighorn sheep lambing

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT CO-17

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

March 16 through September 30

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect white pelican nesting and feeding habitat during usage

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT CO-18

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

February 1 through August 15

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect raptor (this includes golden eagles, all accipiters, falcons [except the kestrels], all butteos, and owls) nesting and fledgling habitat during usage for one-quarter mile around the nest site.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

Exceptions may be granted during years when the nest site is unoccupied, when occupancy ends by or after May 15, or once the young have fledged and dispersed from the nest.

EXHIBIT CO-19

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

February 1 through August 15

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect ferruginous hawk nesting and fledgling habitat during usage for a one-quarter mile buffer around the nest.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

Exceptions may be granted during years when a nest site is unoccupied, when occupancy ends by or after May 15, or once the young have fledged and dispersed from the nest.

EXHIBIT CO-23

Lease Number: <LEASE_NUMBER>

TIMING LIMITATION STIPULATION

No surface use is allowed during the following time period(s). This stipulation does not apply to operation and maintenance of production facilities.

November 16 through April 15

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of (reasons):

To protect bald eagle winter roost sites within a one-half mile buffer around the site

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of the stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

Exception Criteria:

Exceptions may be granted for partial or complete visual screening of the oil and gas activity from the primary zone (that is, one-quarter mile around the roost site).

EXHIBIT CO-28

Lease Number: <LEASE_NUMBER>

CONTROLLED SURFACE USE STIPULATION

Surface occupancy or use is subject to the following special operating constraints.

On the lands described below:

<LEGAL_DESCRIPTIONS>

For the purpose of:

To protect perennial water impoundments and streams, and/or riparian/wetland vegetation by moving oil and gas exploration and development beyond the riparian vegetation zone.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820. See also Geothermal PEIS ROD section 2.3.3 at page 2-6.)

Exception Criteria:

Exceptions may be granted only if an on-site impact analysis shows no degradation of the resource values.

EXHIBIT CO-34

Lease Number: <LEASE_NUMBER>

ENDANGERED SPECIES ACT SECTION 7 CONSULTATION STIPULATION

The lease area may now or hereafter contain plants, animals, or their habitats determined to be threatened, endangered, or other special status species. The BLM may recommend modifications to exploration and development proposals to further its conservation and management objective to avoid BLM-approved activity that will contribute to a need to list such a species or their habitat. The BLM may require modifications to or disapprove proposed activity that is likely to result in jeopardy to the continued existence of a proposed or listed threatened or endangered species or result in the destruction or adverse modification of a designated or proposed critical habitat. The BLM will not approve any ground-disturbing activity that may affect any such species or critical habitat until it completes its obligations under applicable requirements of the Endangered Species Act as amended, 16 U.S.C. § 1531 et seq., including completion of any required procedure for conference or consultation.

EXHIBIT CO-39

Lease Number: <LEASE_NUMBER>

CONTROLLED SURFACE USE STIPULATION

This lease may be found to contain historic properties and/or resources protected under the National Historic Preservation Act (NHPA), American Indian Religious Freedom Act, Native American Graves Protection and Repatriation Act, E.O.13007, or other statutes and executive orders. The BLM will not approve any ground disturbing activities that may affect any such properties or resources until it completes its obligations under applicable requirements of the NHPA and other authorities. The BLM may require modification to exploration or development proposals to protect such properties, or disapprove any activity that is likely to result in adverse effects that cannot be successfully avoided, minimized or mitigated.

Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

EXHIBIT CO-56

Lease Number: <LEASE_NUMBER>

LEASE NOTICE

Due to potential air quality concerns, supplementary air quality analysis may be required for any proposed development of this lease. This may include preparing a comprehensive emissions inventory, performing air quality modeling, and initiating interagency consultation with affected land managers and air quality regulators to determine potential mitigation options for any predicted significant impacts from the proposed development. Potential mitigation may include limiting the time, place, and pace of any proposed development, as well as providing for the best air quality control technology and/or management practices necessary to achieve area-wide air resource protection objectives. Mitigation measures would be analyzed through the appropriate level of NEPA analysis to determine effectiveness, and will be required or implemented as a permit condition of approval (COA). At a minimum, all projects and permitted uses implemented under this lease will comply with all applicable National Ambient Air Quality Standards and ensure Air Quality Related Values are protected in nearby Class I or Sensitive Class II areas that are afforded additional air quality protection under the Clean Air Act (CAA).

On the lands described below:

<LEGAL_DESCRIPTIONS>

EXHIBIT NE-02

Lease Number: <LEASE_NUMBER>

NO SURFACE OCCUPANCY STIPULATION

No surface occupancy or use is allowed on the lands described below (legal description or other description):

<LEGAL_DESCRIPTIONS>

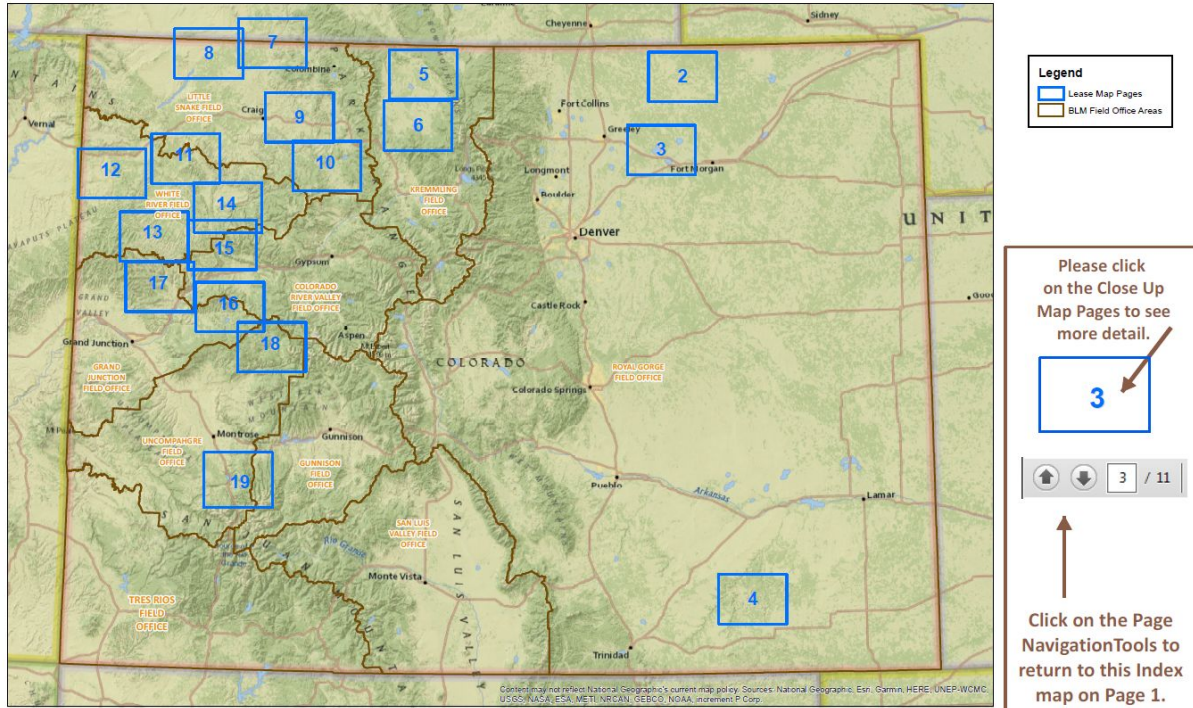
For the purpose of:

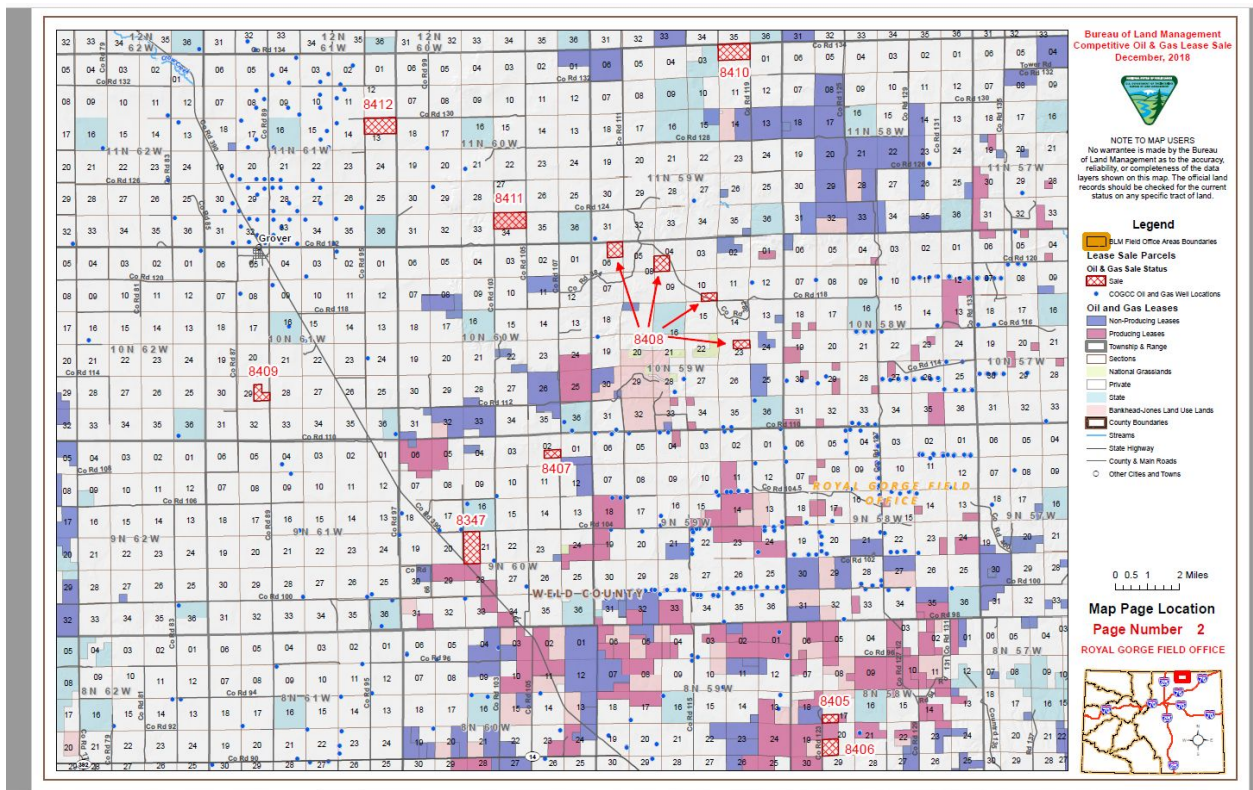
To protecting riparian and wildlife values and resources near reservoirs and rivers (including South Platte and South Republican Rivers and Prewitt, Julesburg, Prospect, Horsecreek, Milton, Lower Latham Rivershed, Empire, Bijou, and Ft. Collins reservoir

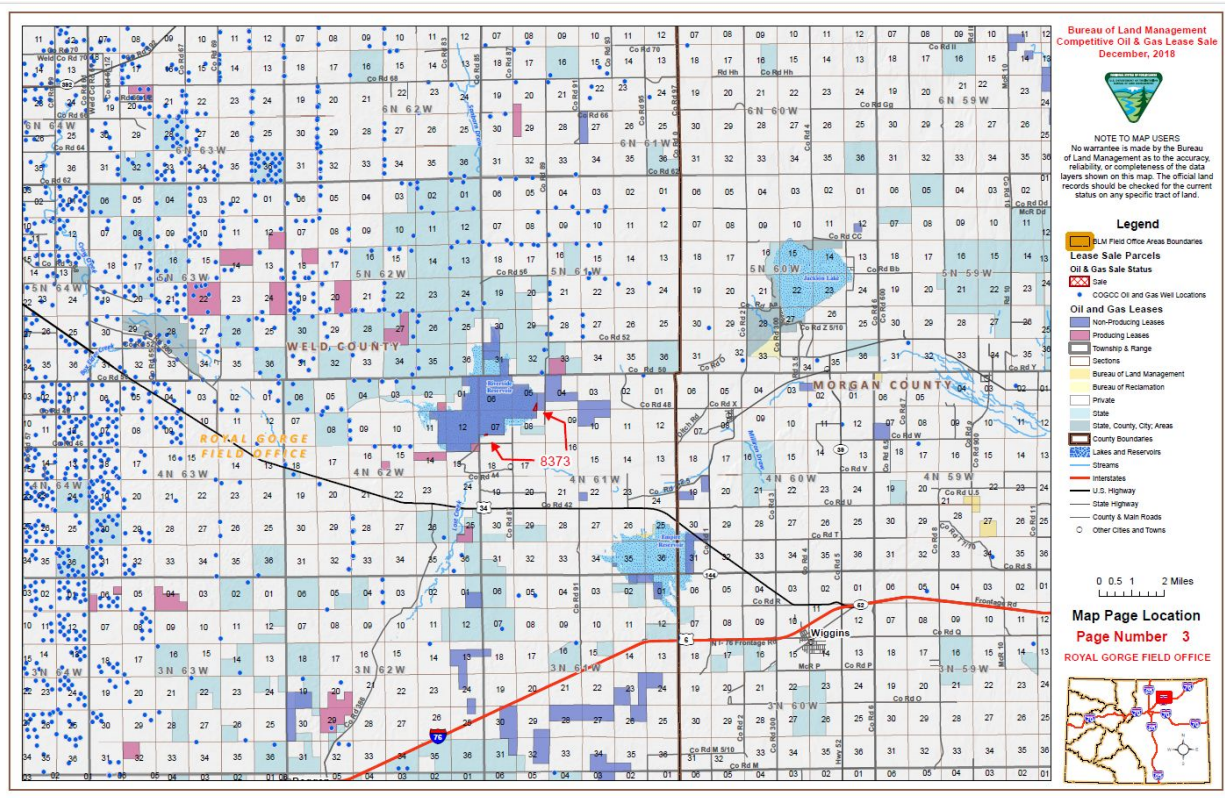
Any changes to this stipulation will be made in accordance with the land use plan and/or the regulatory provisions for such changes. (For guidance on the use of this stipulation, see BLM Manual 1624 and 3101 or FS Manual 1950 and 2820.)

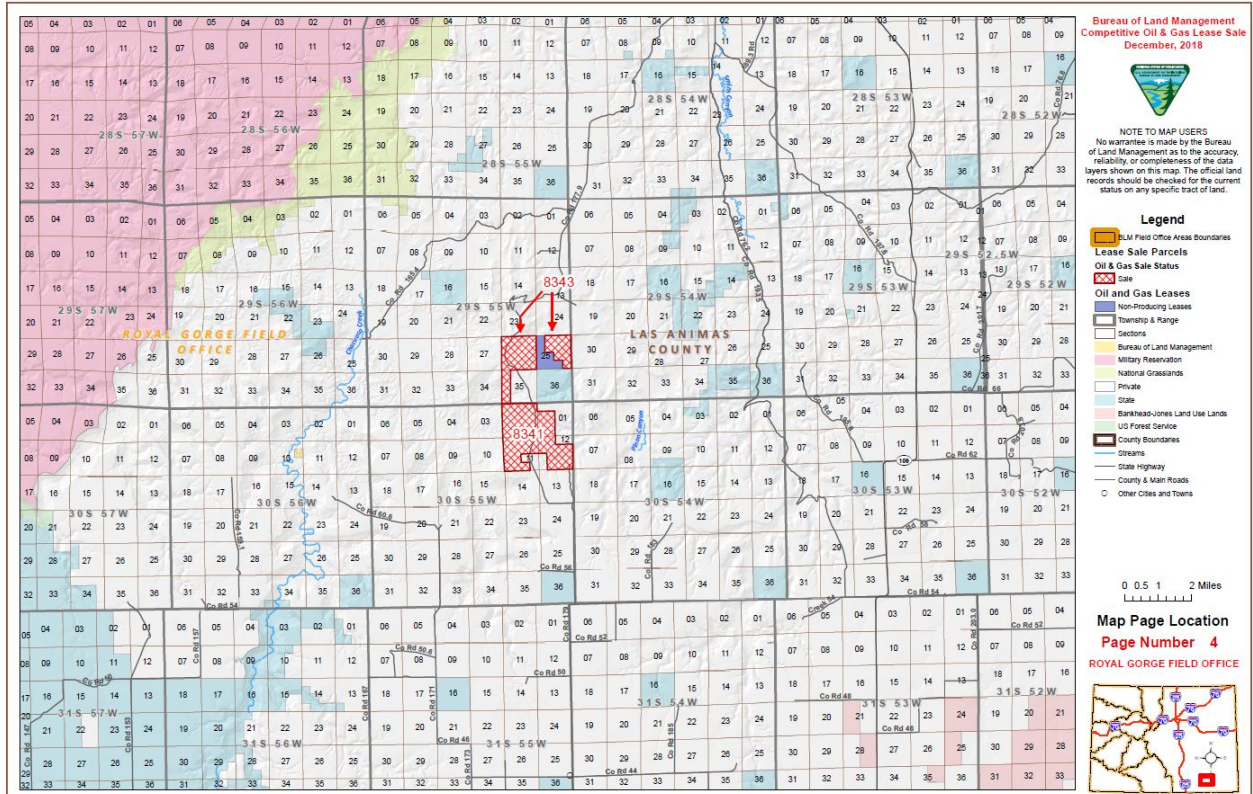
Attachment E - Maps

BLM Competitive Oil and Gas Lease Sale December, 2018









Attachment F - Summary of Public and Interagency Scoping Comments

Topics raised by public comments are summarized and addressed below.

Resource	Concern	Response
Vegetation	Comments about special plant species	The plant species listed in the comments are not T&E or BLM sensitive species. If these leases are developed, site specific reviews at the APD stage will be conducted, and impacts to special status plants, if present, will be analyzed at that time.
Wildlife	Impacts to McCown's Longspur, chestnut-collared longspur, and mountain plover populations as a result of oil and gas development.	The proposed action is to lease or not lease parcels. Appropriate lease stipulations to protect some migratory birds and their habitats were attached to parcels and described in Attachments A and C. Another environmental analysis will be conducted if an application permit to drill (APD) is submitted in the future that will assess population impacts due to development. In addition, at the field development and APD stage it is standard procedure to include a COA on all APDs to protect migratory bird resources. The COA will ensure that operators take measures to prevent destruction of nests and effectively preclude migratory bird access to, or contact with, reserve pit contents that possess toxic properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage, or other harmful features associated with development.
Wildlife	Parcel #8341 is in direct conflict with the following Potential	Appropriate lease stipulations to protect some migratory birds and their habitats were attached to parcels and described in Attachments A and C. This environmental analysis specifically addresses the

	<p>Conservation Areas L4 (External) Higher Biodiversity Significance CNHP 2010, Element Occurrence Long-billed Curlew (Generalized)</p>	<p>reasonably foreseeable impacts to resources that may result from leasing; therefore, the document very broadly discusses potential future impacts. If an application for permit to drill (APD) is submitted in the future, additional site specific environmental analysis will take place to document and mitigate, where possible, potential impacts to resources. In addition, at the field development and APD stage it is standard procedure to include a COA on all APDs to protect migratory bird resources. The COA will ensure that operators take measures to prevent destruction of nests and effectively preclude migratory bird access to, or contact with, reserve pit contents that possess toxic properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage, or other harmful features associated with development.</p>
Wildlife	<p>Concerns with various bird and wildlife species</p>	<p>Lease stipulations to protect some migratory birds and their habitats were attached to parcels and described in Attachments A and C. This environmental specifically address the impacts to resources due to leasing; therefore, the document very broadly discusses potential future impacts. If an application for permit to drill (APD) is submitted in the future, additional site specific environmental analysis will take place to document and mitigate, where possible, potential impacts to resources. In addition, at the field development and APD stage it is standard procedure to include a COA on all APDs to protect migratory bird resources. The COA will ensure that operators take measures to prevent destruction of nests and effectively preclude migratory bird access to, or contact with, reserve pit contents that possess toxic properties (i.e., through</p>

		<p>ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage, or other harmful features associated with development. Appropriate lease stipulations have been attached to parcels to protect plains sharp-tailed grouse sensitive areas and big game winter ranges. Colorado Parks and Wildlife has been consulted with to ensure the proper available stipulations were attached. As stated above, at the APD stage, a site specific analysis will be completed to further evaluate the impacts from development to these resources and mitigate, where possible, potential impacts.</p>
Wildlife	Big Game Winter range, production and concentration areas	<p>Appropriate lease stipulations have been attached to parcels to protect big game seasonal ranges. Colorado Parks and Wildlife has been consulted with to ensure the proper available stipulations were attached. At the APD stage, a site specific analysis will be completed to further evaluate the impacts from development to these resources and mitigate, where possible, potential impacts. There are no greater sage grouse within the RGFO. Potential design features, such as pad and road density, may be added during the APD stage in locations where BLM has management authority.</p>
Wildlife	Public access and pronghorn movement issues due to fencing.	<p>Oil and gas leasing and development does not preclude the public from accessing their public lands. When fencing occurs on public lands, wildlife friendly fence designs are utilized as prescribed by Colorado Parks and Wildlife.</p>

Wildlife	Concerns with Cutthroat trout and Canada Lynx Habitat	There is no habitat for greenback cutthroat trout or Canada lynx within the RGFO December 2018 lease area.
Wildlife	Concerns with big game habitat	Appropriate lease stipulations have been attached to parcels to protect big game seasonal ranges. Colorado Parks and Wildlife has been consulted with to ensure the proper available stipulations were attached. At the APD stage, a site specific analysis will be completed to further evaluate the impacts from development to these resources and mitigate, where possible, potential impacts. Potential design features, such as pad and road density, may be added during the APD stage in locations where BLM has management authority.
Wildlife	Concerns with migratory bird species	Colorado Parks and Wildlife has been consulted with to ensure the proper available stipulations were attached. There are not lease stipulations designed for Potential Conservation Areas (PCA)s. At the APD stage, a site specific analysis will be completed to further evaluate the impacts from development to resources mentioned within PCA documentation if present at the site and to mitigate these potential impacts where BLM has the authority. Appropriate lease stipulations to protect some migratory birds and their habitats were attached to parcels and described in Attachments A and C. This environmental specifically address the impacts to resources due to leasing; therefore, the document very broadly discusses potential future impacts. If an application for permit to drill (APD) is submitted in the future, additional site specific environmental analysis will take place to document and mitigate, where possible, potential impacts to resources. In

		<p>addition, at the field development and APD stage it is standard procedure to include a COA on all APDs to protect migratory bird resources. The COA will ensure that operators take measures to prevent destruction of nests and effectively preclude migratory bird access to, or contact with, reserve pit contents that possess toxic properties (i.e., through ingestion or exposure) or have potential to compromise the water-repellent properties of birds' plumage, or other harmful features associated with development.</p>
Wildlife	<p>Mule deer, elk, and moose. Yellow-billed cuckoo Bald eagle Purple martin and northern goshawk</p>	<p>Colorado Parks and Wildlife has been consulted with to ensure the proper available stipulations were attached. At the APD stage, a site specific analysis will be completed to further evaluate the impacts from development to these resources and mitigate, where possible, potential impacts. The US Fish and Wildlife Service does not include Weld County in the range of the yellow-billed cuckoo. Migratory birds are extremely mobile and while detections in Weld County may be possible, the area does not contain populations of cuckoo. However, as stated above, a site specific analysis will be completed to further evaluate the impacts from development to these resources and mitigate, where possible, potential impacts. Appropriate lease stipulations have been attached to parcels to protect bald eagle roosts and nests. Colorado Parks and Wildlife has been consulted with to ensure the proper available stipulations were attached. At the APD stage, a site specific analysis will be completed to further evaluate the impacts from development to these resources and mitigate, where possible, potential impacts. Raptor nest stipulations have been placed on each proposed parcel to protect nesting raptors.</p>

		There are no available stipulations for purple martins. In addition, it is unknown, based on the letter, any specific locations the authors are referring to. However, at the APD stage, a site specific analysis will be completed to further evaluate the impacts from development to these resources and mitigate, where possible, potential impacts.
NEPA	The BLM did not consider a reasonable range of alternatives	Leasing decisions by the BLM are to lease or not to lease. In this case, the alternatives consist of the proposed action that includes all proposed parcels, a no action alternative, and a preferred alternative. This range of alternatives is sufficient for BLM to consider the potential impacts of leasing and make an informed decision to offer all, some or none of the parcels for lease.
NEPA	The BLM must prepare an Environmental Impact Statement (EIS).	The BLM has reached a Finding of No Significant Impact (FONSI). The analysis presented in the Environmental Assessment identified no potentially significant impacts that warrant an EIS.
NEPA	The BLM must complete the Eastern Colorado RMP and Final Environmental Impact Statement (FEIS) before it can lease the parcels.	The BLM considers the decisions made in the existing Land Use Plans to be sound and appropriate for current oil and gas leasing. Until the BLM revises or amends an existing Land Use Plan, the old plan decisions remain in effect.
NEPA	The BLM cannot defer site specific analysis to the Application for	The leasing EA aids the BLM in its decision whether to lease the parcels under consideration, based on the analysis of potential impacts that are reasonably foreseeable at the leasing stage. Much of

	Permit to Drill (APD) stage.	the information about potential future development is unknown until BLM receives a project proposal. At the time of leasing, BLM does not know whether a parcel will be developed, and if so, where the operator will place pads, wells, roads and infrastructure. The details included in an APD show exactly where disturbance is proposed to occur, and this information allows for environmental impacts to be analyzed in more detail.
NEPA	The BLM must ensure the December lease sale complies with NEPA and FLPMA.	Until a plan is revised BLM follows the decisions in the current land use plans. ,See section 2.4 in the EA. The December 2018 Lease Sale EA complies with FLPMA as stated in Sec 302. [43 U.S.C 1732] (a) The Secretary shall manage public lands under principles of multiple use and sustained yield, in accordance the land use plans developed by him under section 202 of this Act when they are available, except that where a tract of such public land has been dedicated to specific uses according to any other provisions of law it shall be managed in accordance with such law.
Cultural	Santa Fe Historic Trail NPS 2. Parcel #8343 is in direct conflict with Potential Conservation Areas L4 (External) Higher Biodiversity Significance CNHP 2010 and the Santa Fe Historic Trail	The congressionally-designated corridor of the Santa Fe National Historic Trail is located approximately 25 miles to the northwest of Parcel 8343. For this reason, the lease sale will have no effect on the Santa Fe National Historic Trail.

	NPS	
Water	<p>The BLM must also analyze the site-specific, direct and indirect impacts to water quality and quantity that will result from hydraulic fracturing. Potential impacts from hydraulic fracturing include: impacts to water quality and supply, impacts to habitat and wildlife, impacts to human health, as well as impacts to greenhouse gas emissions and air quality.</p>	<p>For more information see section 3.4.1.3.</p> <p>A research network funded by the National Science Foundation (NSF), which engaged 29 researchers at nine institutions, undertook a study of hydrocarbon and fracturing fluid migration in the Wattenberg Field, Denver Basin, CO (Fleckenstein, et al, 2015). The mission of the research is to provide a science-based framework for evaluating the trade-offs between hydrocarbon development and protection of water and air resources. The study of the Wattenberg Field found the following: 1.) There was no evidence of aquifer contamination due to stimulation through wellbores 2.) Of the 17,948 wells in the study area, 10 exhibited signs of hydrocarbon migration to fresh water aquifers. 3.) Probability of hydrocarbon migration in vertical wells due to failure of one or more barriers was 0.06% 4.) Migration of hydrocarbons only occurred in older vertical wells in which the casing did not extend through all usable water zones. The probability of hydrocarbon migration is directly correlated with the age of the well. 5.) There was no evidence of failure of one or more barriers in horizontal wells for shale development. 6.) There was no evidence of hydrocarbon migration in horizontal wells used for shale development.</p> <p>Another study, published in 2018, analyzed methane migration in the Utica Shale region of southern Ohio (Botner, et al, 2018). Wells drilled in the Utica Shale are typically completed using hydraulic fracturing techniques. The collected data as a free public water testing program in Ohio, which tested rural water wells. The study found no increase in CH₄ concentrations in rural water wells, and no change in</p>

		<p>isotopic CH₄ compositions. CH₄ present in groundwater of the study area was determined to be biogenic in origin, and naturally occurring. 180 groundwater samples were collected in this study: three of the samples had naturally occurring concentrations of CH₄ which pose a fire or explosion hazard in enclosed spaces. This study is one of the only spatial-temporal studies of CH₄ concentrations and isotopic values in groundwater in an oil and gas extraction area.</p>
Minerals Geology	<p>The BLM Must take a “Hard Look” at the impacts of hydraulic fracturing. Fracking has not only opened up vast areas of minerals that were previously uneconomical to extract—thereby expanding the total land area impacted by development—the process of fracking also causes more intense impacts to our public health, air, water, land, and wildlife.</p>	<p>For more information, see section 3.4.1.3. If the proposed parcels are developed, wells within the parcels may be completed using hydraulic fracturing techniques. Hydraulic fracturing is intended to change the physical properties of producing formations by increasing the flow of water, gas, and/or oil around the wellbore, resulting from the introduction of water, proppant (sand) and chemical additives into the producing formations. Types of chemical additives used in completion activities may include acids, hydrocarbons, thickening agents, gelling agents, lubricants, and other additives that are operator and location specific. The largest components in hydraulic fracturing fluid are water and sand. The State of Colorado requires operators to publicly disclose all chemicals in hydraulic fracturing fluids used on all wells completed in Colorado using hydraulic fracturing techniques on “FracFocus,” a database available to the public online at http://fracfocus.org/. A research network funded by the National Science Foundation (NSF), which engaged 29 researchers at nine institutions, undertook a study of hydrocarbon and fracturing fluid migration in the Wattenberg Field, Denver Basin, CO (Fleckenstein, et al, 2015). The mission of the research is to provide a science-based framework for evaluating the trade-offs between hydrocarbon development and protection of water and air resources. The study of the Wattenberg Field</p>

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Air	The BLM must consider recent climate science and carbon budgeting.	The Lease Sale EA incorporated by reference GHG and Climate Change information from the online BLM Colorado Air Resources Annual Report which is based on IPCC's latest Report / Study (AR5). The BLM's Annual Report includes IPCC's latest

		baseline and modeled future GHG emissions and Climate Change projections through the end of the century (year 2100). The BLM Annual Report provides information for IPCC's carbon budget, and the Federal oil and gas (including downstream) GHG emissions as part of larger GHG inventories / budgets.
Air	The BLM Must Analyze Site-Specific, Direct and Indirect Greenhouse Gas Emissions That Will Result from the Proposed Action.	The Lease Sale EA provides "typical" new per-well GHG emissions rates that account for direct and indirect oil and gas development activities. The EA then provides information for recent Federal oil and gas projects in the area that supports discussion for new Federal oil and gas development (number of wells, equipment, etc.) potential that could occur on the Lease Parcels.
Air	The BLM Must Analyze Cumulative Greenhouse Gas Emissions That Will Result from the Proposed Action.	The cumulative section of the EA provides projected Colorado Federal oil and gas emissions for two future year scenarios (years 2020 and 2030) for two oil and gas development scenarios (normal and high) that includes direct and indirect emissions for new Colorado Federal oil and gas development. The EA then discusses how total cumulative new Colorado Federal oil and gas emissions fit into larger projected Global GHG emissions budgets.
Air	The BLM must take a hard look at the impacts to air quality and assess visibility and ozone impacts on class I airsheds.	The Lease Sale EA includes CARMMS 2.0 future year 2025 modeled projections of potential nitrogen deposition and visibility impacts at Class I and sensitive Class II areas around the Region, and ozone and PM2.5 concentrations at all locations in the Region including Class I and sensitive Class II areas. The impacts analysis for the EA includes

	The BLM must assess the impacts of the proposed action on air quality standards and public health.	comparing RGFO-specific and cumulative predicted impacts to acceptable impact thresholds, and the air quality changes that could occur from baseline conditions.
Air	The BLM must assess whether the Lease Sale conforms with Colorado's State implementation plan and federal air quality standards for ozone.	The Lease Sale EA discusses General Conformity Review for the proposed Lease Sale. BLM used the CARMMS 2.0 ozone modeling impacts analysis to compare cumulative predicted ozone concentrations to various accepted thresholds including the NAAQS.
Air	The BLM must ensure the NE RMP provides for compliance with the Clean Air Act before leasing the Royal Gorge Field Office parcels.	When the NE RMP FEIS was completed and the ROD was issued (1991), the 1990 Amendments to the Clean Air Act that require Federal agencies to ensure that their actions conform to the SIP were brand new and there was not an ozone nonattainment area in Colorado yet. The NE RMP described that the BLM would provide for compliance with State and Federal Rules / Laws / Regulations over the life of the plan. Since the Plan began, there have been many new State and Federal Laws and Regulations put into place that would affect the level of and how air quality analyses are completed for new Federal actions in the RGFO. The BLM is meeting the NE RMP commitments by completing appropriate analyses during the life of the plan providing for compliance with old (before Plan began) and new (since Plan began) State and Federal Standards. The Lease Sale EA includes a

		section dedicated solely to General Conformity Review.
Air Economics	The BLM must take a hard look at impacts from methane emissions and the social cost of methane protocol. The BLM Fails to Analyze the Costs of Reasonably Foreseeable Carbon Emissions Using Well-Accepted, Credible, GAO-Endorsed, Interagency Methods for Assessing Carbon Costs.	<p>Comments stated that the BLM should utilize the methodologies developed and adopted by the federal Interagency Working Group on Social Cost of Greenhouse Gases (IWG), (originally the Interagency Working Group on Social Cost of Carbon) which include the social cost of carbon (SCC) and social cost of methane (SCM) protocols, to assist agencies in addressing Executive Order (E.O.) 12866, which requires federal agencies to assess the cost and the benefits of proposed regulations as part of their regulatory impact analyses. The SCC and SCM are estimates of the economic damages associated with an increase in carbon dioxide emissions and methane emissions, respectively, and were intended to be used as part of an economic cost-benefit analysis for proposed rules.</p> <p>BLM is not using the SCC or SCM protocols for this lease sale decision for a number of reasons. Most notably, this action is not a rulemaking, for which the protocols were originally developed. Second, on March 28, 2017, the President issued Executive Order 13783 which, among other actions, withdrew the Technical Support Documents upon which the protocols were based and disbanded the Interagency Working Group on Social Cost of Greenhouse Gases. The Order further directed agencies to ensure that estimates of the social cost of greenhouse gases used in regulatory analyses “are based on the best available science and economics” and are consistent with the guidance contained in OMB Circular A-4, “including with respect to the consideration of domestic versus international impacts and the</p>

		<p>consideration of appropriate discount rates” (E.O. 13783, Section 5(c)). In compliance with OMB Circular A-4, interim protocols have been developed for use in the rulemaking context. However, the Circular does not apply to leasing decisions, so there is no Executive Order requirement to apply the protocols to leasing decisions.</p> <p>Additionally, social cost of carbon/methane estimates are just one approach that an agency can take to examine climate consequences from greenhouse gas emissions associated with the proposed leasing. The approach taken by the BLM for this EA to examine climate consequences included calculations to show indirect GHG emissions from oil and gas activities in Colorado at various scales including projections that include the potential indirect and downstream GHGs associated with any future development on the nominated parcels and a qualitative discussion of potential climate impacts at global and statewide scales. The BLM took this approach because climate change and potential climate impacts, in and of themselves, are often not well understood by the general public (Etkin and Ho 2007, National Research Council 2009). This is in part due to the challenges associated with communicating about climate change and climate impacts, stemming in part from the fact that most causes are invisible factors (such as greenhouse gases) and there is a long lag time and geographic scale between causes and effects (National Research Council 2010). Research indicates that for difficult environmental issues such as climate change, most people more readily understand if the issue is brought to a scale that is relatable to their everyday life (Dietz 2013); when</p>
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		<p>the science and technical aspects are presented in an engaging way such as narratives about the potential implications of the climate impacts (Corner, Lewandowsky, Phillips, and Roberts 2015); use examples and make information relevant to the audience while also linking the local and global scales (National Research Council 2010). The approach taken by the BLM recognizes that there are adverse environmental impacts associated with the development and use of fossil fuels on climate change, provides potential GHG emission estimates and discusses potential climate change impacts qualitatively, thus effectively informing the decision-maker and the public of the potential for GHG emissions and the potential implications of climate change. This approach presents the data and information in a manner that follows many of the guidelines for effective climate change communication developed by the National Academy of Sciences (National Research Council 2010) by making the information more readily understood and relatable to the decision-maker and the general public.</p> <p>Furthermore, commenters incorrectly states that the EA touts the “economic benefits of the lease sale.” This EA provides no quantitative monetary estimates of any benefits or costs. NEPA does not require an economic cost-benefit analysis (40 C.F.R. § 1502.23), although NEPA does require consideration of “effects” that include “economic” and “social” effects (40 C.F.R. 1508.8(b)). The EA qualitatively discusses how potential revenue from the lease sale may be disbursed and the potential economic activity that could occur related to potential future oil and gas development of those</p>
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		<p>leases. The potential economic activity such as royalty revenue, jobs and income associated with lease sales and future development should not be mischaracterized as “economic benefits of the lease sale.” Effects associated with production or any other forms of economic activities (often expressed in terms of employment, income, and output) are the results from an economic impact analysis. An economic impact analysis is distinct from a cost-benefit analysis (Watson et al. 2007, Kotchen 2011) and the social cost of carbon/methane estimates are a type of cost-benefit analysis. Based upon their views and values, people may perceive this increased economic activity as a ‘positive’ impact that they desire to have occur; however, that is very distinct from being an ‘economic benefit’ as defined in economic theory and methodology (Watson et al. 2007, Kotchen 2011). Additionally, another person may perceive increased economic activity as a ‘negative’ impact due to potential in-migration of new people, competition for jobs, and concerns that newcomers will change the sense of community and community qualities that are important to herself/himself. Therefore, it is critical to distinguish that how people may perceive an economic impact is not the same as, nor should be interpreted as, a cost or a benefit as defined in an economic cost-benefit analysis.</p> <p>Without any other monetized benefits or costs reported, monetized estimates of the social cost of carbon/methane emissions would be presented in isolation, without any context for comparison. Quantifying only the costs of oil and gas development by using the social cost of carbon/methane metrics but not the benefits (as</p>
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		measured by the economic value of the proposed oil and gas development and production generally equaling the price of oil and gas minus the cost of producing, processing, and transporting the minerals) would yield information that is both inaccurate and not useful for the decision-maker, especially given that there are no current criteria or thresholds that determine a level of significance for social cost of carbon monetary values.
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Attachment F References: Corner, A., Lewandowsky, S., Phillips, M. and Roberts, O. (2015). The uncertainty handbook-A practical guide for climate change communicators. Bristol: University of Bristol.

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